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CONTENTS:

REVISION OF THE SPECIES OF MARSHALLIA . . . *C. D. Beadle and F. E. Boynton* . 3
NOTES ON CERTAIN CONEFLOWERS . . . . . *C. L. Boynton and C. D. Beadle* . 11
NEW OR LITTLE KNOWN SPECIES OF TRILLIUM . . . . . *T. G. Harbison* . 19
NEW SPECIES OF THORNS FROM THE SOUTHEASTERN STATES . . . *C. D. Beadle* . 25
A SHRUBBY OAK OF THE SOUTHERN ALLEGHANIES . . . . . *C. D. Beadle* . 47

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REVISION OF THE SPECIES OF MARSHALLIA

For a number of years certain forms of the genus Marshallia have been appearing in collections made by or coming to the Biltmore Herbarium that have so completely refused to mingle in harmony with representatives of the accepted species, that the writers have ventured to account for them and to recharacterize certain of the earlier published species and varieties with which they may have been confounded. The species proposed by Rafinesque[1] and Bertol[2] have not been identified, nor have we succeeded in finding authentic specimens with which to associate the names.

The writers gratefully acknowledge the assistance accorded them by Prof. G. Macloskie, of Princeton University; Dr. Charles Mohr, of Asheville, N. C.; Dr. Henry Kraemer, of the Philadelphia College of Pharmacy; Mr. William M. Canby, of Wilmington, Delaware; Dr. J. K. Small, of the New York Botanical Garden; Prof. William Trelease, of the Missouri Botanical Garden; Dr. B. L. Robinson, of the Gray Herbarium of Harvard University; and Dr. J. N. Rose, of the United States National Museum, for information concerning certain specimens or for the use of the valuable collections under their charge.

KEY TO THE SPECIES

Scales of the involucre with subulate or attenuate tips . . . *M. graminifolia*
Scales of the involucre with acute or obtuse tips.
  Chaff of the receptacle spathulate . . . . . *M. obovata*
  Chaff of the receptacle slightly if at all dilated at the summit.
    Corolla tubes swollen at the throat.
      Leaves thin, usually less than 12^{cm} long . . . . *M. trinervia*
      Leaves firm, frequently 2–2.5^{dm} or more long . . *M. grandiflora*
    Corolla tubes not swollen at the throat.
      Pappus scales 1–2^{mm} long, species occurring east of the Mississippi.
        Leaves 1.5–3^{cm} wide, ovate-lanceolate . . . . . *M. mohri*
        Leaves narrower, linear-lanceolate . . . . . *M. ramosa*
      Pappus scales 2–4^{mm} long, species occurring west of the Mississippi . . . . . *M. cæspitosa*

[1] New Flora, **4**: 77, 1836.
[2] Mis. Bot., **15**: 22, 1856.

Issued April 8, 1901.

MARSHALLIA GRAMINIFOLIA (Walt.) Small. Plate IX.

Athanasia graminifolia Walt , Fl. Car., 201, 1788.
Persoonia angustifolia Michx., Fl. Bor.-Am., **2**: 106, 1803.
Trattenikia angustifolia Pers. Syn. Pl. **2**: 403, 1807.
Marshallia angustifolia Pursh, Fl. Am. Sept. **2**: 520, 1814; Torr. & Gray, Flora N. Am. **2**: 390, 1842 (exclusive of var *cyananthera*); Chapman, Flora S. U. S. 241, 1860; Gray, Syn. Flora, 2d. ed., **1**: 303, 1886.
Marshallia graminifolia Small, Bull. Torr. Club, **25**: 482, 1898.

A perennial herb 3.5^{dm}–1^{m} tall: stems angled and striate, simple or branched, glabrous near the base, the uppermost portions of the stems together with the peduncles clothed with short, jointed, incurved, purplish-colored hairs: radical leaves spatulate, obovate or oblong-obovate, 3–12^{cm} long, 5^{mm}–1^{cm} broad, mostly 3-nerved; lower cauline leaves linear, linear-oblong or linear-lanceolate, 4^{cm}–2^{dm} long, 2–13^{mm} broad, 1–3-nerved, glabrous; upper cauline leaves gradually reduced in length and breadth, becoming in the uppermost mere linear-subulate bracts: involucral bracts 4–7^{mm} long, subulate pointed, rigid, usually winged below the middle: florets 8–14^{mm} long: corolla externally pubescent, the throat not conspicuously dilated: pappus scales 1–2^{mm} long, pointed, entire or lacerate: achenes angled and ribbed, pubescent, 2–2.5^{mm} long at maturity: chaff of the receptacle linear-subulate.

Low grounds, North Carolina to Florida, westward to Alabama and Louisiana.

The following specimens have been examined: NORTH CAROLINA: Wilmington, *C. S. Williamson*, September 2, 1900; Wilmington, *G. McCarthy*, July, 1885; Wilmington, *Thos. Wood*, September, 1882. GEORGIA: Trader's Hill, *J. K. Small*, July 24–26, 1895. FLORIDA: Lake City, *A. S. Hitchcock*, June–July, 1898; *G. V. Nash*, No. 2221; *P. H. Rolfs*, No. 406; Duval county, *G. V. Nash*, No. 2318; Jacksonville, *L. H. Lighthipe*, No. 333; *H. D. Keeler*, 1870–1876; *A. H. Curtiss*, Nos. 5109, 4493 and 1525 (not 1525*); Apalachicola, *Dr. Chapman*, ex-dist. Biltmore Herbarium Nos. 2807^{a} and 2807^{b}; Mariana, *C. Mohr*, June 21, 1880. ALABAMA: Mobile, *C. Mohr*, August, 1879. LOUISIANA: *Hale*, No. 357.

MARSHALLIA GRAMINIFOLIA CYANANTHERA (Elliott) Plate X.

Marshallia angustifolia cyananthera Elliott, Bot. S C. & Ga. **2**: 317, 1824. Fernald, Bot. Gaz. **24**: 435, 1897.

A depauperate form of the species characterized by slender, simple stems and small heads.

The following examples are noted: FLORIDA: Argyle, *A. H. Curtiss*, No. 5932; Lake City, *P. H. Rolfs*, No 370; Liberty County, *A. H. Curtiss*, Aug. 1894. ALABAMA: Flomaton, Biltmore Herbarium, Aug. 15, 1899.

MARSHALLIA GRAMINIFOLIA LACINARIOIDES (Small) Plate XI.

Marshallia lacinarioides Small, Bull. Torr. Club, **25**: 482, 1898.

Differing from typical *M. graminifolia* by the erect basal leaves (which are from 1–2^{dm} long, 1–1.5^{cm} broad and prominently 3-nerved), the branched and very leafy stems and small heads.

Same range as the species.

The following specimens are noted: NORTH CAROLINA: Newberne, *Croom*. SOUTH CAROLINA: Society Hill, *M. A. Curtis*. GEORGIA: Macon, *Croom*. LOUISIANA: *Hale*, no locality.

MARSHALLIA OBOVATA (Walt.) Plate V.

Athanasia obovata Walt., Fl. Car. 201, 1788.
Persoonia lanceolata Michx., Flora Bor.-Am. **2**: 105, 1803.
Trattenikia lanceolata Pers.; Syn. Pl. **2**: 403, 1807.
Marshallia lanceolata Pursh, Flora Am. Sept. 519, 1814; Chapman, Flora S. U. S. ed. 1: 241, 1860; Gray, Syn. Flora, ed. 2: 303, 1886.

In describing his *Athanasia obovata* Walter was very brief, but the writers have no hesitancy in using his name to represent the species here described.

A perennial herb 1.5–3^{dm} tall, with simple striate stem pubescent near the summit, leafy near the base, naked above: radical leaves obovate, 1–4^{cm} long with the petiole; stem leaves lanceolate or oblanceolate, 5^{cm}–1^{dm} long including the petiole, 3^{mm}–1^{cm} wide, entire, glabrous, obtuse at the apex, or occasionally acutish, narrowed at or below the middle of the blade and prolonged into a margined and sheathing petiole: involucre 5^{mm}–1^{cm} high, the scales 2–2.5^{mm} wide: florets 10–13^{mm} long, pubescent, with shallow throat: pappus scales lacerate, 1.5–2^{mm} long: achenes ribbed, hairy: chaff of the receptacle spathulate.

Dry woods, North Carolina to Florida and Alabama.

The following specimens are cited: NORTH CAROLINA: Bladen county, Biltmore Herbarium, No. 1258. SOUTH CAROLINA: Aiken, *Wm. M. Canby*, May, 1869; *Gerald McCarthy*, October, 1888; Aiken, *H. W. Ravenel*. ALABAMA: Lee county, *Earle & Baker*, April 24, 1897; Cherokee, *C. Mohr*, May 16, 1881. FLORIDA: *Chapman*.

MARSHALLIA OBOVATA PLATYPHYLLA (Curtis) Plate VI.

M. lanceolata platyphylla Curtis, Chap. Fl. S. U. S., ed. 1, 241, 1860; Gray, Syn. Flora, ed. 2, 303, 1886.

More common than the species, at least in herbaria, and differing mainly in the longer stems, which are leafy to near the middle, 3–5^{dm} tall, larger and broader leaves, often 1–1.5^{dm} long and 1–2^{cm} wide.

Same range as the species.

The following specimens have been examined: NORTH CAROLINA: Tryon, *E. C. Townsend*, May 24, 1897; *Hyams*, June, 1879; Hillsborough, *M. A. Curtis;* Yadkin River Region, *J. B. Britton;* Rowan county, *Small & Heller*, No. 485. SOUTH CAROLINA: Abbeville, *L. R. Gibbes*, 1855; Seneca, *G. McCarthy*, June, 1888. GEORGIA: *Chapman*, no date or locality; Yellow River valley, Biltmore Herbarium, No. 1258^{b}; same locality, *J. K. Small*, May, 1895; Augusta, *A. Cuthbert*, No. 327; *G. Vasey*, 1878 (in part). FLORIDA: *Dr. Chapman.*

MARSHALLIA TRINERVIA (Walt.) Porter. Plate IV.

Athanasia trinervia Walt., Fl. Car. 201, 1788.
Persoonia latifolia Michx., Fl. Bor.-Am. **2**: 105, 1803.
Trattenikia latifolia Pers., Syn. Pl. **2**: 403, 1807.
Marshallia latifolia Pursh, Fl. Am. Sept. **2**: 519, 1814; Torr. & Gray, Flora N. A. **2**: 390, 1842; Chapman, Flora S. U. S. 241, 1860; Gray, Syn. Flora, 2d ed., **1**: 303, 1886.
Marshallia schreberi Tratt. Arch. Gew. **1**: 108, 1812–18, (ex. DC. l. c. and Torr. & Gray, l. c.)
Marshallia trinervia Porter, Mem. Torr. Club, **5**: 337, 1894; Britton & Brown, Ill. Flora, **3**: 443, 1898.
Figures: Michx., Fl., Bor.-Am., t. 43; Tratt. Arch. Gew. t. 123, (ex. DC. and T. & G. l. c.); Britton & Brown, Ill. Fl. t. 3956.

A perennial herb 3–7^{dm} tall: stem simple or occasionally branched, glabrous, or pubescent near the summit, angled and striate, leafy to near the summit: leaves thin, 5–12^{cm} long, 1–3.5^{cm} wide, the cauline ovate or ovate-lanceolate, the lowest lanceolate or a little broader; they are glabrous, 3-nerved, acute or acuminate at the apex, narrowed to a sessile or subsessile base: peduncles 5^{cm}–2^{dm} long: involucre hemispheric or broadly campanulate, the bracts 6^{mm}–1^{cm} long, 1–2^{mm} broad, linear-lanceolate, acute, glabrous: florets 1–1.5^{cm} long, pubescent, the tube of the corolla dilated at the throat: pappus scales about 1.5^{mm} long, entire, lanceolate, acuminate: achenes angled and ribbed,

about 2^{mm} long, pubescent, at least when young: chaff of the receptacle narrowly linear, acute.

Moist or dry soil, Virginia and Tennessee to Alabama and Mississippi.

The following specimens have been examined: VIRGINIA: *Mr. Stebbins*, no locality. TENNESSEE: Tullahoma, Coffee county, Biltmore Herbarium, No. 4215^{c}. ALABAMA: *S. B. Buckley*, no locality; Auburn, *Earle & Baker*, May 28, 1898; *Earle & Baker*, No. 1345; Sand Mountain, Biltmore Herbarium, No. 4215^{d}; Windhem's Springs, *E. A. Smith*, June 23, 1875; limestone cliffs of Little Cahawba river, *C. Mohr*, June 3, 1883. MISSISSIPPI: *Dr. J. T. Stewart*, no locality; *Prof. E. Hilgard*, May, 1859, no locality.

Marshallia grandiflora n. sp. Plate I.

A perennial herb $3.5–7^{dm}$ tall: radical leaves $5^{cm}–2^{dm}$ long including the petioles, $1–2^{cm}$ wide, varying from lanceolate to ovate-lanceolate in outline, obtuse at the apex and gradually narrowed at the base and prolonged into broad petioles as long as the blades: stem-leaves ovate-lanceolate, $1–3^{dm}$ long including the petioles, $1–3^{cm}$ wide, gradually diminishing in size up the stem to leaves $1–4^{cm}$ long and $3–7^{mm}$ wide; they are obtuse at the apex, or the uppermost acutish, gradually narrowed into broad petioles as long as the blades, firm in texture and displaying 3–5 prominent nerves: stem angled and striate, glabrous except the peduncle, which is minutely scabrous-pubescent: involucre $7^{mm}–1^{cm}$ high, the bracts oblong-lanceolate, acute at the apex, glabrous, and with narrow hyaline margins, $7^{mm}–1^{cm}$ long, $2–3^{mm}$ wide, thin in texture at flowering time, the midrib slightly thickened: florets $1.5–2^{cm}$ long: corollas slender, pubescent, the tubes about 1^{cm} long, the upper third conspicuously dilated: pappus scales entire, sharply pointed, about 2^{mm} long: mature achenes ribbed and hairy, $4–5^{mm}$ long, $1.5–2^{mm}$ broad: chaff of the receptacle linear, pointed.

Marshallia grandiflora was collected in full flower July 22, 1898, near Saluda, Polk county, North Carolina (type locality), and is also represented in the Biltmore Herbarium from a station near Hendersonville, North Carolina, and Upshur county, West Virginia (W. M. Pollock, July 4, 1896). The proposed species is related to *M. trinervia* (Walt.) Porter, l. c., from which it may be distinguished by the longer and thicker leaves and larger heads and florets. The type material is preserved in the Biltmore Herbarium.

Mostly in moist soil, western North Carolina to West Virginia and Pennsylvania.

The following specimens have been examined: North Carolina: Hendersonville, *J. D. Smith*, Aug, 1881; Saluda, Polk county, Biltmore Herbarium No. 4215[a]. West Virginia: Upshur county, *W. M. Pollock*, June 24, 1895, July 1, 1895, and July 4, 1896. Pennsylvania: Ohio Pyle, *H. L. Clark*, 1894

Marshallia mohri n. sp. Plate III.

A perennial herb 4–7[dm] tall: leaves ovate-lanceolate, 1.5–2.5[dm] long, including the petioles, 1.5–3[cm] wide, the uppermost much reduced in size, obtuse at the apex or the upper acute, gradually narrowed at the base and prolonged into petioles as long as or longer than the blades, the uppermost sessile; they are prominently 3-nerved, glabrous and in age firm in texture, entire: stem angled, striate, glabrous to near the top, branched above the middle: heads usually several, containing from thirty to seventy-five or more flowers: involucres 5–8[mm] high, the bracts thin at flowering time, ovate-lanceolate, acute at the apex, 2–3[mm] wide with conspicuous hyaline borders below the middle: florets 1–1.5[cm] long: corollas slender, pubescent, the tubes about 7[mm] long, slightly if at all dilated at the throat: pappus scales 2[mm] long, acute, the borders broken by a few sharp points: achenes ribbed, very hairy: chaff of the receptacle linear, acute.

Marshallia mohri closely resembles *M. grandiflora*, above proposed, but may be recognized by the smaller heads and florets and by the absence of the dilated corolla tubes so conspicuous and noteworthy in the last-named species. The type specimen was collected by Dr. Charles Mohr, for whom the species is named, at Cullman, Cullman county, Alabama, June 24, 1893, and is preserved in the Chapman Herbarium at Biltmore.

Moist soil, northern Alabama and northwestern Georgia.

The following specimens are referred here: Alabama: Cullman, *C. Mohr*, June 1, 1882, June 23, 1893, and August 15, 1886; Cullman, *H. Eggert*, June, 1897. Georgia: Lookout Mountain, *A. Ruth*, Nos. 638 and 662.

Marshallia ramosa n. sp. Plate II.

A much-branched herb 2–4[dm] tall: stems leafy, solitary or clustered from a perennial root: radical leaves linear-lanceolate, 5[cm]–1.5[dm] long including the petiole, 5–8[mm] wide, obtuse at the apex, narrowed towards the base and prolonged into a petiole as long as or longer than the blade; lower stem-leaves 8[cm]–1.5[dm] long, 5[mm]–1[cm] wide, linear-lanceolate, the apex obtuse and gradually narrowed towards the base, 3-nerved, firm in texture, glabrous and

quite entire: upper leaves much reduced in size, linear-lanceolate to linear-oblong: stem striate, glabrous, alternately branched above the middle: peduncles slender, striate, finely and sparingly scabrous-pubescent, especially near the summit: heads 8–20 or even more, containing 20–60 or more flowers: involucres 4–6^{mm} high, the bracts oblong, rounded at the apex and minutely mucronate, smooth, 1–2^{mm} wide, thin in texture at flowering time, the midrib slightly thickened: florets 9–12^{mm} long: corollas slender, pubescent, the tubes about 5^{mm} long, very slightly dilated at the throat: pappus scales 1.5–2^{mm} long, the upper half lacerate: achenes ribbed, hairy: chaff of the receptacle linear, pointed.

Marshallia ramosa grows in moist, sandy pine-lands at Eastman, Georgia (type locality), where it was collected in full flower June 5, 1900, by Mr C. L. Boynton, of the Biltmore Herbarium. At this station the species is very abundant, giving color to large patches of ground. It is related to *M. cæspitosa* Nutt., l. c., especially the variety described below, differing mainly from the latter in the extremely floriferous habit, shorter and more obtuse involucral bracts and by the shorter pappus scales. The type material is preserved in the Biltmore Herbarium.

MARSHALLIA CÆSPITOSA Nutt. Plate VII.

DC. Prod. **5**: 680, 1836.— "1. M. CÆSPITOSA (Nutt. ! in litt. 1825), glabra cæspitosa, caule simplici aphyllo 1-cephalo, foliis elongato- et lato-linearibus subobtusis integerrimis, invol. squamis oblongo-linearibus obtusis, paleis recept. linearibus. 4 in Amer. bor. ad Red-River legit cl. auctore. Habitus ferè Armeriæ. Caulis 8-10-pollic. teres striatus. Cor. exsicco albæ, fortè subroseæ. Achænium villosum. (v. s.)."

Hook. Bot. Mag. t. 3704; Torr. & Gray, Flora **2**: 391, 1842.

Moist woods and prairies, Arkansas and Indian Territory to western Louisiana and Texas.

The following specimens are referred here: TEXAS: Houston, *Elihu Hall*, No. 365; *F. Lindheimer*, Nos 32, 110 and 47; *Drummond*, Nos. 111 and 174; Austin, *Berlandier*, No. 1566. ARKANSAS: Fort Gibson, *Dr. Englemann*. INDIAN TERRITORY: McAllister, *J. H. Oyster*, May 16, 1883; Limestone Gap, *G. D. Butler*, No 11150. LOUISIANA: *Hale, Leavenworth.*

MARSHALLIA CÆSPITOSA **signata** n. var. Plate VIII.

A perennial herb 2–4^{dm} tall: stems tufted, striate, usually branched, leafy to near the summit; the peduncles clothed with

fine, white, jointed hairs, especially dense at the base of the involucre: radical and basal leaves linear, 4^{cm}–1^{dm} long, 2–4^{mm} wide, the upper cauline similar in outline, but gradually reduced in size; they are blunt at the apex, sessile, or at the base gradually narrowed into margined and sheathing petioles about half the length of the blades: involucres 6^{mm}–1^{cm} high, the scales about 2^{mm} wide, acutish and with hyaline margins to near the apex: florets (30–75 or more in a head) 10–12^{mm} long, pubescent on the outer surface, with no conspicuous throat: pappus scales lacerate, 2–3^{mm} long: achenes ribbed and hairy: chaff of the receptacle linear, acute or acutish.

Marshallia cæspitosa signata differs from the species in the weaker and very leafy stems, and usually much-branched habit. The extreme forms of variety and species are very distinct. Based on A. A. Heller's No. 1618 from Kerrville, Kerr county, Texas, April 19–25, 1894.

The following specimens, all from Texas, are referred here: Turtle Creek, *W. L. Bray*, No. 269; Fredericksburg, *W. L. Bray*, No. 269[a]; Burnet county, *F. G. Schaupp*, August, 1892; *E. Hall*, No. 336; *F. Lindheimer*, Nos. 53 and 647; *S. B. Buckley*, no date.—C. D. Beadle and F. E. Boynton.

Biltmore Herbarium,
Biltmore, N. C.

NOTES ON CERTAIN CONEFLOWERS

The following paper, based upon material of certain Coneflowers preserved in several herbaria, is offered with a view of relieving some of the confusion which has surrounded a number of these interesting plants. Through the kindness of Professor William Trelease of the Missouri Botanical Garden, Dr. B. L. Robinson of the Gray Herbarium of Harvard University, Mr. Stewardson Brown of the Philadelphia Academy of Natural Sciences, Dr. Charles Mohr of Asheville, and Dr. J. T. Rothrock of the University of Pennsylvania, the writers have been permitted to use the valuable specimens in their keeping and these, supplemented by the material at the Biltmore Herbarium, together with careful field notes, have made the study possible.

Brauneria atrorubens (Nutt.)

Rudbeckia atrorubens Nutt., Jour. Acad. Phila. **7**: 80, 1834.
Echinacea atrorubens Nutt., Trans. Am. Phil. Soc. N. S. **7**: 354, 1841.

Sixty-seven years ago Nuttall described in the Journal of the Academy of Philadelphia, a form of *Brauneria* to which he applied the name of *Rudbeckia atrorubens* and afterwards transferred it to the genus *Echinacea*. Although his type specimen is preserved in the herbarium of the Philadelphia Academy of Sciences and most clearly represents a form of *Brauneria*, yet the name has been misapplied by American botanists to designate a *Rudbeckia* of the South Atlantic and Gulf region. Nuttall's description of his species is brief, but good, and the vivid contrast between *B. atrorubens* and *B. purpurea*,[3] which was quoted by Torrey and Gray[4] would easily establish its validity when contrasted with species of its genus. Unfortunately a true *Rudbeckia* was admitted by Torrey and Gray, l. c., as a variety of Nuttall's *Echinacea atrorubens*, the supposed variety afterwards being interpreted by Dr. Chapman[5] as the plant originally described by Nuttall. This error was given

[3] Mem. Torr. Club **5**: 334, 1894.
[4] Fl. N. Am. **2**: 306, 1842.
[5] Flora S. U. S. 226, 1860.

further complexity by Dr. Gray,[6] who, abandoning the first name applied to the *Rudbeckia*, adopted the earlier name of Nuttall. Thus the *Brauneria* was lost sight of and the *Rudbeckia* made to assume a false name. Supplementing Nuttall's description of the purple cone-flower, the writers notice, besides all of the characters pointed out by him, a fusiform blackened root similar to those of *B. pallida*[7] and distinct from the horizontal or horizontally-inclined rootstock of *B. purpurea*, l. c. The label accompanying the type specimen would indicate that the original was collected in Arkansas; indeed, Nuttall so describes it, and a supplementary note accredits the same form from North Carolina.

RUDBECKIA GRAMINIFOLIA (T. & G.)

Echinacea ? atrorubens β. *? graminifolia* T. & G., Flora N. A. 2: 306, 1842.

Echinacea atrorubens Chapm. Flora S. U. S. Ed. 1 & 2. (Not Nutt.)

Rudbeckia atrorubens Gray. Syn. Flora, I: 259, 1886. Chapm. Flora S. U. S. Ed. 3. (Not Nutt.)

The notes printed above under *Brauneria atrorubens* expose the necessity for changing the name of this southern *Rudbeckia*, and having a number of specimens at hand collected in Florida by Dr. Chapman, we venture to add to the descriptions of Torrey & Gray, l. c., Dr. Gray, l. c., and Dr. Chapman, l. c., as follows:

Perennial, 6–8.5^{dm} tall: stem simple, rigid, slender, striate, glabrate or strigose-pubescent, prolonged into a long, naked peduncle: radical leaves narrowly linear, elongated, 1–3^{dm} long, 4^{mm}–1^{cm} broad, rigid, 3-nerved, the lateral nerves at the extreme borders of the blades, acute at the apices, narrowed below and passing insensibly into apparent petioles, glabrous and glossy or strigose-pubescent: cauline leaves few, similar to the radical, gradually diminished in size towards the summit, where they are but 2–4^{cm} long, the uppermost not conspicuously narrowed at the base: involucres imbricated in 2–3 rows, the bracts 6–9^{mm} long, acuminate from a broad base, smooth or nearly so above, hairy below: rays 8–10, oblong, 8–12^{mm} long, deep crimson, pubescent on the lower surface: disks at first hemispherical, eventually oblong-ovoid, dark purple: chaff of the receptacle

[6] Syn. Flora I: 259, 1886.

[7] Mem. Torr. Club 5: 333, 1894.

relatively thick and firm, 4.5–6^{mm} long, 1.5–2^{mm} wide, smooth or a little hairy on the back, the apex mucronate: florets a little longer than the chaffy scales, the lobes of the corolla erect: achenes 2–3^{mm} high, the pappus a minute coroniform border toothed at the angles.

The range of *R. graminifolia* probably does not extend beyond Florida and southern Georgia, where it inhabits the margins of pine barren ponds.

Rudbeckia speciosa Wender. Ind. Sem. Hort. Marb. 1828 and Flora, **1**: Suppl. 30, 1829.

Although the original citations of *R. speciosa* have not been viewed by the writers, authentic specimens from Marburg and Berlin are at hand, and in view of the confusion surrounding this most distinct species in American herbaria and literature, it would seem to be proper to recharacterize it in this paper. It is well described by Torrey and Gray,[8] who liberally extend the characters to include forms "with the upper leaves shorter and ovate-lanceolate or oblong," and by Dr. Gray,[9] barring the description of leaves, achenes and chaffy bracts of the receptacle. The species is fairly figured by Britton & Brown,[10] but the description, like the instances noted, embraces related forms. Both Dr. Gray and Britton & Brown, l. c., doubtfully refer Persoon's *R. aspera*[11] to the species under discussion, a disposition not suggested, and it would seem correctly so, by DeCandolle.[12]

A perennial herb 5^{dm}–1^{m} tall: stem angled, striate, hirsute or hispid, branched: radical leaves elliptical, 1–3^{dm} long including the petiole, 2.5–5^{cm} broad, 3–5-nerved, acute at the apex, narrowed at the base and prolonged into a slender petiole, 7^{cm}–1.5^{dm} long, sparingly rough-hairy: cauline leaves elongated-lanceolate, often falcate, the lower 1–2^{dm} long, including the petiole, 1–4^{cm} broad, the uppermost sessile and entire or nearly so, much reduced in size; they are coarsely and irregularly serrate or laciniately-dentate, 1–3-nerved, roughish-hirsute, the apex acuminate, narrowed at the base, subsessile or petioled,

[8] Flora N. Am. **2**: 308, 1842.
[9] Syn. Flora, 2d ed. **1**: 261, 1886.
[10] Ill. Flora **3**: 417, 1898.
[11] Syn. **2**: 477, 1807.
[12] Prodr. **5**: 556, 1836.

the latter organs frequently 5–6^{cm} long, winged: peduncles 5^{cm}–2^{dm} long, hirsute: involucres imbricated, the bracts 6^{mm}–2^{cm} long, 2–3^{mm} broad, hairy, especially on the margins: rays 12–20 or more, 2.5–3.5^{cm} long, 4–7^{mm} wide, 2–3-toothed at the apex, the lower surface pubescent: disks 13^{mm}–2^{cm} broad, 8^{mm}–1.5^{cm} high, dark or reddish purple: chaff of the receptacle 5–6^{mm} long, 1–1.5^{mm} broad, pointed, smooth, or with a few scattered hairs on the back, the borders near the summit erose: florets 5.5–6.5^{mm} long, the corolla lobes erect: achenes 2.5–3^{mm} high, the pappus consisting of a minute coroniform border accentuated at the angles.

Rudbeckia speciosa occurs from Pennsylvania (Wilkesbarre, Dr. Sartwell) to Georgia, (Dr. Chapman, no station given) and westward to Missouri (Iron County, Colton Russell).

Rudbeckia chapmani n. sp.

A perennial herb 4^{dm}–1^{m} tall: radical leaves 2–5^{dm} long including the petiole, the blade broadly ovate-lanceolate, 7^{cm}–2^{dm} long, 3^{cm}–1^{dm} broad, harshly but inconspicuously pubescent on both surfaces, 5–7-nerved, truncate or cordate at the base, the borders dentate or coarsely crenate-dentate: the petioles striate, sparingly pubescent or nearly glabrous: cauline leaves ovate-lanceolate, the upper much reduced in size, either rounded or narrowed at the base, all but the uppermost with petioles but little shorter than the blades, the borders remotely dentate or nearly entire, sparingly pubescent on both surfaces: stems conspicuously angled, especially near the base, striate, sparingly pubescent or glabrous, branched near the summit: involucres foliaceous, imbricated, the divisions short, 6–12^{mm} long, 2–4^{mm} broad, glabrate or with lines of short hairs along the margins and principal nerves: rays 12–16, 1.5–2.5^{cm} long, 3–6^{mm} broad, 2–3-toothed at the apex, pubescent on the lower surface: disk hemispherical to conical, 8^{mm}–1.5^{cm} high, 1–1.5^{cm} broad: chaff of the receptacle 4–5^{mm} long, about 1^{mm} wide, abruptly pointed at the apex and ciliate with a few short hairs: florets a little longer than the chaff, dark purple, the lobes of the corollas erect: pappus a shallow coroniform border.

Rudbeckia chapmani was originally collected in the mountains of Georgia by

Dr. A. W. Chapman and was described and distributed by him as *R. heliopsidis*, a species which differs widely from the one under discussion, especially in the smaller heads, the reflexed corolla lobes and short, blunt and pubescent-tipped chaff of the receptacle. The proposed species is possibly best contrasted with *R. speciosa* Wender,[13] from which it differs in the cordate or truncate radical leaves, the slender petiolate, shorter, broader and more entire cauline leaves and the smaller, more abruptly pointed scales without erose borders.

The type material is preserved in the Chapman Herbarium at Biltmore.

Mountains of Georgia (Dr. A. W. Chapman, no locality; Dr. T. P. Cleaveland, Dalton, Ga.) and Alabama (Dr. G. Vasey, 1878).

Rudbeckia sullivanti n. sp.

A perennial herb 5^{dm}–1^{m} or more tall: stem striate, hispid, branched near the top: radical leaves 1.5–4^{dm} long including the petioles, 5^{cm}–1^{dm} broad, the blades one-half to one-third the length of the slender petioles; they are oval or broadly ovate-lanceolate, acute or acuminate at the apex, either narrowed, rounded, truncate or subcordate at the base, prominently 5-nerved, the borders coarsely and irregularly serrate or serrate-dentate, more or less rough-hairy, especially on the upper surface: lower cauline leaves ovate-lanceolate, acuminate, narrowed at the base and prolonged into winged petioles 4–7^{cm} long, the blades 10–14^{cm} long, 4–8^{cm} wide, prominently 3-nerved, more or less rough-hairy, particularly on the upper surface, the margins coarsely and irregularly serrate or serrate-dentate, the narrow point entire or nearly so: upper cauline leaves reduced in size, narrower and shorter petioled, the uppermost subsessile and entire: peduncles 1–3^{dm} long, striate, rough-pubescent or hispid: involucres imbricated, the bracts 8–12^{mm} long, 2–3^{mm} wide, the margins hairy: rays 10–15 or more, 2–4^{cm} long, 3–6^{mm} wide, 2–3-toothed at the apex, pubescent on the lower surface: disks hemispherical or ovoid, 12–18^{mm} wide, 10–15^{mm} high, dark or reddish purple: chaff of the receptacle 5.5–6.5^{mm} long, 1.5–2^{mm} broad, acute at the erose apex which, on the outermost scales, is sparsely ciliate: florets 6.5–7.5^{mm} high, the corolla lobes erect: achenes 3–4^{mm} long, with minute coroniform pappus toothed at the angles: style tips blunt.

Rudbeckia sullivanti represents a part of the material described by Torrey & Gray in the Flora of North America, l. c., and by Dr. Gray in the Synoptical Flora, l. c., under *R. speciosa*, a species to which it is closely related, but from

[13] Ind. Sem. Hort. Marb., 1828.

which it may be easily separated by the broader leaves of different outline and the larger florets and achenes. From *R. chapmani*, elsewhere proposed, this species differs in the larger, broader and more sharply pointed erose-bordered chaff, larger florets and thinner, more sharply cut leaves.

The original specimens were collected in 1840, at Columbus, Ohio, by Mr. W. S. Sullivant, and are preserved in the Gray Herbarium of Harvard University. Specimens from the same region have been distributed by Mr. W. C. Werner, September 10, 1892, No. 128.

Rudbeckia umbrosa n. sp.

A perennial herb, 4^{dm}–1^{m} tall: stem striate, somewhat pubescent, either simple or branched: radical leaves ovate, prominently 5–7-nerved, coarsely serrate, rounded, truncate or even cordate at the base, 1–2^{dm} long including the slender, pubescent petioles, 3–5^{cm} wide, pubescent on both surfaces: lower cauline leaves similar to the radical, but with shorter petioles and more acute apices: upper stem leaves much diminished in size, short-petiolate or subsessile, narrower and more entire than the lower: involucres foliaceous, imbricated, the bracts oblong or linear-oblong, 10–15^{mm} long, 2–3^{mm} wide, thin in texture, pointed, 1-nerved, pubescent: rays usually 8–12, 1.5–2^{cm} long, 5–9^{mm} wide, yellow or orange-yellow, 2–3-toothed at the apex, pubescent on the lower surface: disks 1–1.5^{cm} wide, 8–12^{mm} high, dark purple: chaff of the receptacle relatively broad, about 5^{mm} long, 2–3^{mm} wide at the broadest part, hairy at the apex: disk flowers purple, the corolla lobes erect: style branches obtuse: achenes displaying prominent coroniform pappus.

Rudbeckia umbrosa inhabits the woodlands, usually in moist soil, of White, Warren and Coffee counties, east Tennessee, and is likely to be found over a greater area of the Cumberland plateau. The type material, preserved in the Biltmore Herbarium, was collected near Sparta, White county, August 5, 1900. The proposed species is related to *R. speciosa* Wender, l. c., differing from the latter species in the broad and hairy-tipped chaff, size of flower-heads, shorter and fewer rays, and in the outline of the leaves.

Rudbeckia palustris Eggert in Herb.

Perennial, 5–7^{dm} tall: stems angled below, striate pubescent near the summit, usually branched: lower cauline leaves 1–1.5^{dm} long including the petiole, 2–4^{cm} broad, ovate-lanceolate, remotely serrate or dentate or nearly entire, 3–5-nerved, reticu-

lately veined, a little pubescent on both surfaces, the petioles winged, 3–7^{cm} long, or more, with clasping base: upper stem-leaves gradually diminishing in size, sessile or nearly so, more entire: peduncles 3^{cm}–1.5^{dm} long, pubescent: involucral bracts imbricated, 5–12^{mm} long, 2–4^{mm} wide, hairy on the margins: rays about 8–12, 12–22^{mm} long, averaging 5^{mm} in width, pubescent on the lower surface, 2–3-toothed at the apex: disks conical or hemispherical, 8–12^{mm} high, 1–1.5^{cm} wide, dark colored: chaff of the receptacle 4–5^{mm} long, about 1^{mm} wide, pointed, a little hairy at the apex: florets 5–6.5^{mm} long, the corolla lobes erect: pappus a minute coroniform border accentuated at the angles: style tips blunt.

Rudbeckia palustris inhabits moist or swampy places in Iron county, Missouri, collected September 27, 1893, and distributed under this name by Mr. Henry Eggert, of East St. Louis, Ill. The species passes in herbaria as *R. speciosa*, but may be recognized by the hairy-tipped chaff of the receptacle, usually smoother leaves and stems, the former more entire and of different outline.

Besides the original specimens the following are noted: Missouri: Shannon County, *B. F. Bush*, September 12, 1888; Swan, Tracy County, *B. F. Bush*, No. 567.

Rudbeckia missouriensis Engelmann in Herb.

A perennial herb 4–6^{dm} tall: stems striate, pubescent, fastigiately much-branched or occasionally simple, leafy to the inflorescence: radical leaves entire, 3-nerved, linear-lanceolate to oblong-lanceolate, 5^{cm}–2^{dm} long including the slender petioles, 7–12^{mm} wide, very pubescent on both surfaces, the petiole about as long as the blade: cauline leaves linear to linear-lanceolate, entire, nearly or quite sessile by a tapering base, pubescent, gradually reduced in size upwards or at least on the branches: peduncles short, 2^{cm}–1^{dm} long, pubescent: involucres foliaceous, imbricated, the bracts 8–10^{mm} long, 2–3^{mm} wide, pubescent, 1-nerved: rays usually 12–14, 1.5–2.5^{cm} long, 4–6^{mm} broad, 2–3-toothed at the apex, hairy on the lower surface: disks 1–1.5^{cm} broad, 8–12^{mm} high, dark purple: chaff of the receptacle entire, pointed, 5–7^{mm} long, 1–2^{mm} wide: florets purple, 7–9^{mm} long, the corolla lobes erect: style branches obtuse: achenes with very short coroniform pappus.

This species of *Rudbeckia* has a most interesting history. Both Mr. George

W. Letterman and Mr. Henry Eggert were instrumental in bringing specimens to the attention of Dr. George Engelmann, who, proposing to publish it as a new species, distributed specimens to his correspondents under the name *Rudbeckia missouriensis*. Dr. Gray, considering the form identical with *R. fulgida* Ait., evidently discouraged Dr. Engelmann from publishing the manuscript. Further notes, together with a colored plate, appeared in Meehan's Monthly, December, 1896.

The writers gratefully acknowledge material assistance from Dr. James Britten, of the British Museum, in the form of a tracing of the type specimen of Aiton's *Rudbeckia fulgida*.

Rudbeckia missouriensis differs from *R. fulgida Ait.*[14] in the narrower entire leaves, which are never subcordate, shorter peduncles, fastigiate branches (divergently branched in *R. fulgida*) and the greater degree of pubescence.

The description is drawn from material collected by Mr. George W. Letterman, at Allenton, Missouri, and distributed as *R. missouriensis* by Dr. Engelmann.

The following specimens are noted: Missouri: St. Louis county, Allenton, *G. W. Letterman*, September, 1879; Jefferson county, *Henry Eggert*, August 19, 1886; McDonald county, *B. F. Bush*, September 1, 1893, No. 206; Barry county, *B. F. Bush*, September 19, 1896, No. 113; Pulaski county, *Wm. Trelease*, August 13, 1897. Arkansas: Eureka Springs, *Dr. Gladfelter*.

C. L. Boynton and C. D. Beadle.

Biltmore Herbarium,
Biltmore, N. C.

[14] Hort. Kew. 3: 251, 1789.

NEW OR LITTLE KNOWN SPECIES OF TRILLIUM

For a number of years the writer has been interested in the genus *Trillium*. In the spring of 1886, a large yellow *Trillium* was observed in the mountains of North Carolina. In the spring of 1893, the same species was again observed in a different locality and reported to several of the leading botanists of our country. From the information received it was evident that several species in this genus were imperfectly understood. Dr. A. W. Chapman became sufficiently interested in this yellow *Trillium* to modify his description of *T. sessile* L., so as to admit a yellow form. Since then I have continued my observations in the field, and during the past few years have had an opportunity to study herbarium specimens from a wide range. The botanists of our country during the latter part of the last century seem to have had the idea that this genus contains a very limited number of species, and there was a tendency to discard the proposed species of the earlier botanists. This genus includes several species which show a remarkable degree of variation, with a tendency to produce aberrant forms. That some of these extreme forms should have been mistaken for true species is very evident; but that all of the proposed species were invalid seems incredible. That all of Rafinesque's thirty-four proposed species besides numerous varieties were invalid seems hard to believe, and possibly a few of them were valid species; but it would be a hopeless task to attempt to revise his work, since many of his types are lost or destroyed. It is, therefore, proper to state that the numerous species proposed by Rafinesque have been ignored.

It seems to be an accepted idea among botanists that the color of the petals affords a character of but little taxonomic value, and my own observations lead me to the same conclusion; but even though we conclude that color, size and shape of petals and sepals and the length and position of the peduncle afford no characters of sufficient value to constitute a species, there are several forms with peduncled flowers which remain unclassified.

In the present paper one species of peduncled *Trillium* is

proposed as new, two new sessile-flowered species are proposed, an ignored variety raised to specific rank, and a much neglected species mentioned and its range extended. It is the intention of the writer to publish his observations in the peduncled *Trillium* group in a future paper.

I am greatly indebted to Dr. B. L. Robinson of the Gray Herbarium of Harvard University, Dr. Charles Mohr of Asheville, N. C., and Mr. Henry Eggert of East St. Louis, Ill., for the use of material. To Mr. Stewardson Brown, of the Philadelphia Academy of Natural Sciences, I am indebted for information concerning certain forms in the Muhlenberg Herbarium and for a copy of the original description, in manuscript, of one of Muhlenberg's varieties of *Trillium*.

TRILLIUM DISCOLOR Wray, in litt. Hook. Bot. Mag. t. 3097, 1831.

This species of sessile-flowered *Trillium* seems to be poorly represented in herbaria. On no other grounds can we account for the unfair treatment it has received. With good material at hand, I believe no botanist would decide against the specific standing of this very distinct species. It differs from *T. sessile* L.[15] in the outline and mottling of the leaves, length of filaments, shape of anthers, and color and form of petals. Extreme forms of another species of sessile-flowered *Trillium* are preserved in certain herbaria as *T. discolor*. Dr. Chapman in his Flora[16] describes an entirely different plant and apparently never saw the true *T. discolor*. In view of the confusion surrounding this species, it would seem proper to republish the original description for the benefit of those who have not access to the magazine in which it appeared. "*Stem* nearly a span high, erect, flexuose, of the thickness of a goose-quill, glossy, dark purple, green above, where, at the very extremity, it bears a *whorl* of three large, broadly oval, quite sessile, acute, spreading *leaves*, perfectly glabrous, dark green and obscurely blotched above, paler beneath, with five wavy ribs, which are connected by oblique nerves. *Flower* solitary, large, sessile in the center of the three leaves, and at the summit of the stem. *Calyx* of three large, green, spreading *sepals*, oval-oblong, acute. *Petals*

[15] Sp. Pl. 304, 1753.
[16] Chapm. Flora S. U. S. ed. 3 : 504, 1896.

three, erect, half as long again as the calyx, obovate, very obtuse, with a short blunt mucro, of a pale sulphur-yellow inclining to green, tapering below into a broad and pale green claw. *Stamens* six, about one-third the length of the petals, erect: *Filaments* very short, purple. *Anthers* linear, dull purple, acute, and a little incurved at the extremity, the cells lateral, longitudinal, yellow. *Pistil: Germen* ovate, three-lobed, with two prominent angles at the margin of each lobe, purplish-green. *Styles* linear-obtuse, purple without, yellow within."

Trillium discolor was first observed by the writer in the spring of 1887, in the mountainous region of South Carolina. The following spring it was found growing in a shaded situation along a rocky stream in the adjacent region of North Carolina. On a subsequent occasion it was collected at several stations in the northern part of South Carolina and is represented by a specimen in the Biltmore Herbarium collected in April, 1897. This species seems to be confined to a limited range and is apparently quite rare. The specimens observed by the writer agree essentially with the original figure and description. The short, blunt mucro is, however, not a constant character. In many plants the petals are acute or abruptly acuminate, and abruptly acuminate leaves are common. Blooms in March and April.

TRILLIUM LUTEUM (Muhl.)

Trillium sessile L., Muhlenberg's Cat. 38, 1813. Var. *luteum*. Calyx: 3ph. Corolla: 3 pet. lut. Habitat: Tennessee.

Dr. Muhlenberg in a manuscript volume preserved in the library of the Philadelphia Academy of Natural Sciences, under the title "Observationes Botanicæ de Plantis Americanæ Septentrionalis," describes the form under consideration as a variety of *T. sessile* L., as follows:

"Caule:
foliis: ternis maculatis ovatis, acutis sessilibus trinervis.
flore: terminali sessili.
Calix: 5-phyll. lanceolat. subovatus patulus.
Corolla: 3-petala lutea, petalis lanceolatis striatis, calice diplo longioribus erectis.
Stamens: 6 antheris luteis pistillo longioribus, filamentis brevibus.
Pistils: stilis 3 antheris paulo brevioribus."

This yellow sessile-flowered *Trillium* exhibits another instance in which a remarkably constant and distinct form has been discarded, simply because it has not come under our observation. It is, perhaps, the yellow *Trillium* referred to by Pursh,[17] where he

[17] Pursh, Fl. Am. Sept. 244, 1814.

writes under *Trillium sessile* L.: "I have seen a specimen with yellow flowers, brought from the Cherokee Nation, which probably may be a distinct species."

First collected by the writer in the "Cherokee country" in North Carolina, in the spring of 1886, this yellow-flowered form was found on several subsequent occasions in other stations in the mountains of the same state and adjacent Tennessee. This is not a rare plant, and it seems strange that it should have been lost sight of for so many years. In proposing this apparently little known *Trillium* as being worthy of specific standing, it seems proper to recharacterize it in this paper.

Stem erect, from a horizontal rootstock, solitary or clustered, 1.5–3.5^{dm} tall, stout, smooth: leaves sessile, broadly ovate to ovate-orbicular, 8–16^{cm} long, acute or abruptly acuminate, mottled: flowers sessile; sepals lanceolate, 3–5^{cm} long, obtuse or acute, green or tinged with purple, somewhat spreading; petals lanceolate or broad-lanceolate, about half as long again as the sepals, acute or acutish, erect, bright yellow: stamens one-fourth to one-third as long as the petals at maturity: filaments very short, yellow: anthers 1.4–1.8^{cm} long, straight, yellow: stigmas somewhat recurved, shorter than the anthers, yellow: berry ovoid, greenish, 1–2^{cm} in diameter.

In woods and along streams in North Carolina and Tennessee. April and May.

North Carolina: Marshall, *E. E. Magee*, May, 1896; Hot Springs, Biltmore Herbarium, April, 1897. Tennessee: Knoxville, *A. Ruth*, April, 1897; Knoxville, *Thos. H. Kearney, Jr.*, April, 1897.

Trillium luteum has, in some instances, been confounded with *T. discolor* Wray, l. c., from which it is well distinguished by its larger size, differently shaped petals, stouter and more recurved stigmas, and yellow stamens. From *T. sessile* L., l. c., it may readily be separated by its larger size, the mottling of the leaves, shorter filaments, color of the petals and character of the stigmas. From *T. underwoodi* Small[18], it may readily be separated by the color of the petals, ovary, filaments and anthers, but in all other respects these forms of the sessile-flowered *Trillium* are remarkably similar. That *T. luteum* finds its nearest relative in *T. underwoodi* is very evident, and intergrading forms ranging from dark purple to greenish would indicate a very close affinity. By segregating *T. underwoodi* from *T. sessile* and by pointing out the true characters of the latter, Dr. Small has rendered great service to the student of this group, and it is to be regretted that *T. luteum* was overlooked in his valuable paper.

[18] Torr. Bot. Club. **24**: 172, 1897.

Trillium stamineum n. sp.

Stem erect from a horizontal rootstock, solitary or clustered, 1–3^{dm} tall, pubescent near the top: leaves sessile, ovate-lanceolate to broadly ovate, 5–8^{cm} long, acute or acuminate, mottled and usually somewhat pubescent on the veins beneath: flowers sessile, fetid: sepals broadly lanceolate to elliptic, 2–3^{cm} long, acute or acutish, deeply tinged with purple, spreading or finally reflexed: petals lanceolate, about as long and one-half to two-thirds as wide as the sepals, dark purple, widely-spreading, somewhat twisted: stamens one-half to two-thirds as long as the petals: anthers stout, 1.5–1.8^{cm} long, straight, dark purple: filaments short, dark purple: stigmas slender, spreading and recurved: berry ovoid, pale purple, about 1^{cm} in diameter.

In rocky woods, central Alabama. Blooms in Cullman county, Alabama (type locality), about the middle of April.

Trillium stamineum finds its nearest relative in *T. sessile* L., l. c., but may be easily recognized by its pubescent stem, widely-spreading, twisted petals, unpleasant odor, larger stamens, and very short filaments.

The type material is preserved in the Biltmore Herbarium.

Trillium ludovicianum n. sp.

Stem erect from a horizontal rootstock, solitary or clustered, 8^{cm}–2^{dm} tall, smooth: leaves sessile, ovate to broadly ovate, 5–8^{cm} long, acute or obtuse, mottled: flower sessile: sepals lanceolate to broadly lanceolate, 2–3.5^{cm} long, acute or obtuse, tinged with purple at the base, spreading or finally reflexed: petals linear to linear-lanceolate, 3–6^{cm} long, scarcely as broad as the sepals, acute or acutish, purple or greenish above and purple at the base, spreading: stamens one-fourth to one-third as long as the petals: anthers erect, straight or slightly recurved, 1.2–1.8^{cm} long: filaments about 4^{mm} in length: stigmas slender, spreading and reflexed: berry ovoid, pale purple, about 1^{cm} in diameter.

In low, rich woods, Louisiana. March and April.

The species with which *Trillium ludovicianum* is likely to be confounded are *T. viride* Beck,[19] and *T. lanceolatum* Boykin.[20] From the former it may be easily separated by its smooth stem, and from the latter by its shorter stem, broader leaves, broader sepals, shorter filaments and straight anthers.

In making a comparative study of the different parts of a Trillium flower,

[19] Am. Journ. Sci. **2**: 178, 1826.

[20] Ex. S. Wats. in Proc. Am. Acad. **14**: 274, 1879.

measurements should be made when the flower is fully developed, as the appended table will prove. Ten different plants of *Trillium ludovicianum* were measured daily by the writer, for ten days after the first opening of the flowers. From the data given it will be seen that at one stage of development the stamens were half as long as the petals, but less than one-third on the sixth day after anthesis and but slightly more than one-fourth as long on the ninth day, when the petals had reached their highest development.

	1st day	2d day	3d day	4th day	5th day	6th day	7th day	8th day	9th day	10th day
	cm	cm	cm	cm	cm	cm	cm	cm	cm	cm
Length of petals	2.9	3	3.2	3.5	4.1	4.6	5	5.2	5.5	5.5
Width of petals	.5	.55	.55	.55	.55	.55	.55	.55	.55	.55
Length of sepals	2.9	2.9	2.9	3	3.1	3.2	3.4	3.5	3.6	3.6
Width of sepals	.5+	.6	.6	.6+	.7	.7	.7	.7	.7	.7
Length of anthers	1.4	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Length of filaments	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4
Length of stigma	.5	.5	.5+	.6	.6+	.7	.7	.7	.7	.7
Length of leaf	5.8									6.1
Width of leaf	3.5									3.6
Height of plant	6.7									9.3

Trillium vaseyi n. sp.

Stem erect from a horizontal rootstock, 2.5–5^{dm} tall, smooth: leaves sessile or subsessile, broadly round-rhomboidal, abruptly acuminate, contracted into a broadly-winged, sessile or subsessile base, 1–2^{dm} long: flowers on a deflexed or recurved peduncle, 1–2 times the length of the flower: sepals lanceolate to ovate-lanceolate, acute, 2–4^{cm} long: petals ovate or broadly ovate, of about the same length and twice as broad as the sepals, acute or obtuse, dark purple: stamens about twice as long as the ovary at anthesis, spreading: filaments about as long as the anthers, purple: stigmas short and slender, less than half as long as the anthers, spreading or recurved: berry ovoid, somewhat angled, pale purple or reddish, 1–2^{cm} in diameter.

Moist, shady woods of the high mountains of the southern Alleghanies. Ascends to 1,500 meters in Macon county, N. C. April and May.

Trillium vaseyi has been, I presume, confounded with extreme forms of *T. erectum* L., l c. It may be readily separated from it, however, by its long slender filaments, smaller stigmas and peduncle, which is deflexed beneath the leaves before anthesis. This Trillium was collected in the mountains of North Carolina in 1878 by Dr. George Vasey, whose name I take pleasure in associating with this species.—T. G. Harbison.

Biltmore Herbarium,
Biltmore, N. C.

NEW SPECIES OF THORNS FROM THE SOUTHEASTERN STATES

Cratægus buckleyi n. sp.

A tree frequently attaining a height of 8^{m} and a diameter of trunk of $1–1.75^{dm}$, or more often a large much-branched shrub with one or more stems: trunk branched a little above the surface of the ground or occasionally presenting a clear stem of $3–4^{m}$ clothed with dark gray bark which is often tinged with brown, or much blackened, the surface broken into numerous small plate-like scales and marked by shallow fissures: branches horizontal or ascending, armed, as in the trunk, with strong, much-branched spines: branchlets dark ashy-gray or reddish-brown, slender, bearing short, stout spines $2–4^{cm}$ long, which are dark chestnut-brown in color and usually a little curved: buds globular, bright reddish-brown: leaves which are half-grown or more at flowering time, glabrous at maturity, thin at first but eventually subcoriaceous in texture, yellowish-green, $2–7^{cm}$ long including the petiole, $1–5^{cm}$ wide, or even larger on vigorous shoots, fading in October with tones of yellow and brown; they are ovate or round-ovate in outline, sharply and irregularly serrate and incisely lobed, acute at the apex, rounded or narrowed at the base and prolonged into a margined and glandular petiole $1–3^{cm}$ long, or on vigorous shoots larger and more deeply lobed and with truncate or subcordate base: flowers, which expand in the vicinity of Biltmore, North Carolina (type locality), about the middle of May, produced in simple, glandular-bracteate, mostly 3–7-flowered corymbs: pedicels glabrous, $8–12^{mm}$ long, bearing one or more pectinately-glandular caducous bractlets: calyx obconic, glabrous, the divisions $3–5^{mm}$ long, glandular-serrate and pectinately-glandular below the middle, reflexed after anthesis, mostly persistent and coloring slightly with the fruit: petals orbicular, or broader than long, $8^{mm}–1^{cm}$ in diameter, the claw at the base broad and short: stamens 10, $6–8^{mm}$ long, the anthers purplish: styles 3–5, surrounded at the base with pale hairs: fruit subglobose, angled,

red or russet-red, 8–12^{mm} in diameter, containing from 3–5 hard, bony nutlets, which measure 7.5–9^{mm} in length and 4–5^{mm} in thickness from back to inner angle and display prominent dorsal ridges and grooves and plane lateral surfaces.

Cratægus buckleyi is one of the most common thorns in the mountains of North Carolina and adjacent Tennessee and Virginia, inhabiting woods and banks and standing in company with oaks, pines and hickories. It is well represented in herbaria from the region noted, and has shared in common with other southern forms in the impersonation of *C. coccinea*, *C. glandulosa* and *C. rotundifolia*. Having noticed a specimen of the proposed species collected along the French Broad river near Hot Springs by Mr. S. B. Buckley many years ago, the oldest specimen I have seen, I have decided to commemorate his name. *C. buckleyi* is very closely related to *C boyntoni*[21], but easily recognized by the purple color of the anthers, the stalked glands below the middle of the calyx segments—a character not found in *C. boyntoni*—and also by the larger seeds and relatively later period of blossoming.

The type sheets, consisting of flowers and fruit from the same tree, are preserved in the Biltmore Herbarium.

Cratægus tecta n. sp.

A shrub 2–5^{m} tall, with one or more stems: bark dark ashy-gray, frequently blackened near the base, fissured, the surface broken into numerous small scaly pieces; of the branches gray tinged with reddish-brown: spines 1–4.5^{cm} long, gray or chestnut-brown: leaves ovate or round-ovate, 2.5–9^{cm} long, including the petiole, 1.5–6^{cm} broad, sharply and irregularly serrate and incisely lobed, acute at the apex, rounded or narrowed at the base and prolonged in margined, gland-bearing petioles 5^{mm}–3^{cm} long, thin to firm in texture, glabrous or with a few hairs at the time of unfolding, bright green above, paler below, fading in autumn to tones of yellow and brown: flowers, which appear when the leaves are nearly fully grown, borne in 3-6-flowered, glabrous corymbs, expanding in the vicinity of Albertville, Alabama (type locality), early in May: pedicels 5–15^{mm} long, glabrous, bearing one or more narrow, pectinately-glandular, caducous bractlets: calyx obconic, glabrous, the segments 3–4^{mm} long, serrate or sparingly so to entire, reflexed after anthesis: petals nearly orbicular, 6.5–8^{mm} in diameter: stamens normally 20, 4–5^{mm} long, the anthers light purple: styles 3–5, surrounded at the base

[21] Bot. Gaz. **28**: 409, 1899.

with pale hairs: fruit, which ripens and falls the last of September and first of October, red, globose, 10–13^{mm} in diameter: nutlets 3–5, hard and bony, 6–7^{mm} long, 3.5–4.5^{mm} measured from the back to the inner angle, the lateral faces nearly plane and the back strongly ridged and grooved.

Cratægus tecta is abundant in rocky woodlands in Marshall county, Alabama. Contrasted with *C. buckleyi*, above proposed, the species just described may be recognized by the smaller flowers, thinner leaves, more numerous stamens and smaller habit of growth.

The type material is preserved in Biltmore Herbarium.

Cratægus pallens n. sp.

A tree in its best stages of development, 5–7^{m} tall, or under less favorable conditions a much-branched shrub with one or several stems: bark of the trunk dark ashy-gray, frequently much blackened near the base, the surface broken into numerous small plate-like scales by shallow fissures: trunk and larger branches armed with strong gray or chestnut-brown spines, which are frequently compound; branchlets relatively slender, the bark smooth, in color varying from dark gray through shades of reddish-brown to bright reddish-brown on the new growth: spines straight or slightly curved, dark chestnut-brown, 3–6^{cm} long: buds globular, bright reddish-brown: leaves, which appear before the flowers, light or even yellowish-green in color, fading in October with decided tones of yellow and brown, thin to subcoriaceous in texture, 2–8^{cm} long including the petiole, 1.5–5^{cm} broad; they are ovate, round-ovate or occasionally obovate in outline, acute at the apex, the borders sharply and irregularly serrate or incisely lobed, contracted at the base and prolonged into margined and glandular petioles 1–3^{cm} long, or frequently rounded or on the strong shoots truncate or subcordate at the base: flowers, which expand at Biltmore, N. C. (type locality), about the tenth of May, produced in simple, mostly 5–7-flowered, glandular-bracteate corymbs: pedicels 1–2^{cm} long, glabrous, bearing one or several pectinately-glandular caducous bractlets: calyx obconic, glabrous, the divisions 3–5^{mm} long, glandular-serrate or pectinately-glandular, glabrous except a few hairs along the ventral surface: petals orbicular, 6–9^{mm} in diameter, the claw short and broad, persistent for a day or so: stamens normally

20, 4–7^{mm} long, the anthers purple : styles mostly 3, sometimes 4–5, surrounded at the base with pale hairs : fruit subglobose to oval, yellow or greenish-yellow in color, ripening and falling in October, 8–15^{mm} wide, 8–16^{mm} high : nutlets usually 3, hard and bony, 7–9^{mm} long, 3.5–5^{mm} thick measured dorso-ventrally, the back strongly ridged and grooved, but the lateral faces nearly plane.

Cratægus pallens was discovered in upland woods near Biltmore, N. C., growing with oaks, pines, hickories, etc., seeming to prefer the rich but comparatively dry soil of shallow valleys. The proposed species is related to *C. sargenti*[22] and *C. venusta*[23]. Contrasted with the former it may be distinguished by the shorter pedicels, narrower and less persistent calyx segments and the less pointed leaves, while from the last cited species it differs in the color of the anthers, shorter leaves and smaller flowers.

The type specimens, consisting of flowers and fruit from the same tree, are preserved in the Biltmore Herbarium.

Cratægus dispar n. sp.

A shrub 3–4^{m} tall, with drooping branches, or sometimes arborescent, with a short trunk 1–2^{m} in length and about 1^{dm} in diameter : bark of the trunk and older branches dark gray or gray tinged with brown, rough or at the base deeply furrowed and much blackened : branchlets pendulous, zigzag, armed with numerous stout, gray or chestnut-brown spines 2.5–5.5^{cm} long, the bark varying in color from gray to tones of red and brown, the growth of the season being clothed with dense, pale tomentum : leaves obovate to orbicular in outline, or those of the strong shoots conspicuously broader than long, 1.5–6^{cm} long including petiole, 8^{mm}–4^{cm} wide, the majority being about 4^{cm} long and 2^{cm} wide; they are densely tomentose at the time of unfolding, becoming with age glabrate on the upper surface and somewhat lucid, the under surface retaining the tomentum, especially along the prominent ascending veins, until fallen and nearly decayed ; they are subcoriaceous in texture, sharply and irregularly serrate and incisely lobed, especially above the middle of the blade, the serratures glandular-apiculate, rounded at the apex or short pointed ; at the base either rounded or gradually narrowed from near the middle of the blade, and prolonged into a glandular, tomentose petiole 5^{mm}–1.5^{cm}

[22] Bot. Gaz. **28** : 407, 1899.
[23] Bot. Gaz. **30** : 338, 1900.

long: corymbs densely white-tomentose, 3–7-flowered: pedicels 8mm–1.5cm long, tomentose: calyx obconic, pubescent or tomentose, the divisions 5–6mm long, glandular, serrate, coloring with the fruit: stamens normally 20: styles 3–5, surrounded at the base with pale hairs: petals nearly orbicular, 6–9mm in diameter, with a short broad claw at the base: fruit, which ripens in the vicinity of Aiken, South Carolina (type locality), the last of July or early in August, red, subglobose or oval, 8–12mm long, 7–10mm wide, sparingly pubescent or glabrate: nutlets 3–5, hard and bony, 6–7mm long, 2.5–3.5mm measured dorso-ventrally, the back nearly smooth or slightly ridged, the lateral faces nearly plane.

Cratægus dispar belongs to the group of which *C. michauxi* Pers.,[24] and *C. senta*[25] are types. From the former it may be distinguished by the serrate and incised borders of the leaf blades, while from the last-named species it differs in the size of the fruits and nutlets, time of ripening and by the outline and character of the leaves. The proposed species has been collected in sandy soil at Aiken, South Carolina, and in similar situations at Trenton in the same state and at Augusta, Georgia. It is one of the earliest of the autumnal fruiting thorns to ripen at the stations mentioned.

The type sheet is preserved in the Biltmore Herbarium

Cratægus lassa n. sp.

A tree occasionally attaining the height of 5m, with a short, straight trunk clothed with rough and frequently furrowed bark, or more often a large much-branched shrub with one or several stems: bark of the trunk and larger branches dark ashy-gray or much blackened; of the slender, zigzag and drooping branchlets, which are frequently armed with short spines, gray tinged with reddish-brown: leaves cuneiform, 1.5–4.5cm long, including the margined petiole, 7mm–2cm wide, or on the shoots more dilated or frequently broader than long and with rounded bases; they are pubescent at the time of unfolding, soon becoming glabrate, except along the petiole, midrib and in the axils of the prominent, ascending veins, either rounded at the apex and with a short, abrupt point, or nearly truncate with one or more short points or shallow lobes, the borders roughened with many black-colored sessile glands: flowers, which expand in the vicinity of

[24] Syn. Plant. **2**: 38, 1807.
[25] Bot. Gaz. **30**: 341, 1900.

Selma, Alabama (type locality), about the middle of April, borne in 2–5- mostly 3-flowered corymbs: pedicels 5^{mm}–1.5^{cm} long, densely pubescent, and bearing one or more linear, glandular and caducous bractlets: calyx obconic, densely pubescent, the divisions about 5^{mm} long, glandular, reflexed after anthesis: stamens normally 20, 3–5^{mm} long, the anthers yellow: styles 3–5, surrounded at the base with pale hairs: fruit, which ripens early in August, pyriform, 8–10^{mm} wide, 10–13^{mm} high, orange-red, the cavity 3–4^{mm} wide, surrounded by the persistent calyx segments: nutlets 3–5, hard and bony, 6–7^{mm} long, 3–4^{mm} measured from the back to the inner angle, the lateral faces nearly plane and the back without prominent grooves or ridges.

Cratægus lassa is common in the sandy oak-barrens near Selma, Alabama. Generally referred to *C. flava* in herbaria, the writer is, however, inclined to associate and contrast it with *C. michauxi* Pers., l. c., from which species it differs mainly in the shape of the fruit and leaves.

The type material is preserved in the Biltmore Herbarium.

Cratægus frugiferens n. sp.

A shrub 1–5^{m} tall or occasionally arborescent, with a short, slender trunk: bark of the trunk or larger branches dark ashy-gray, frequently blackened near the base; of the branchlets gray tinged with reddish-brown, the growth of the season reddish-brown marked by small pale lenticels: winter buds globular, the scales thick, rounded at the apex, bright reddish-brown: spines numerous, short and stout, 1–3^{cm} long, or occasionally larger, gray or chestnut-brown: leaves obovate, oval or round-ovate, 1-8^{cm} long including the petiole, 1.5–6^{cm} broad, a little pubescent at the time of unfolding, becoming glabrous or with a few hairs along the winged glandular petioles and prominent veins, bright green, fading in autumn with tones of yellow and brown, firm in texture; they are sharply and irregularly serrate and incisely lobed, mostly acute at the apex, rounded at the base and abruptly contracted into petioles 5^{mm}–2^{cm} long: flowers, which open in the vicinity of Cullman, Alabama (type locality), the latter part of April, borne in mostly simple 3–5-flowered very sparsely hairy corymbs: pedicels 7^{mm}–1.5^{cm} long, bearing a few weak hairs and one or more narrow, glandular or pectinately-glandular, caducous bractlets: calyx obconic, glabrous, the divisions about 4^{mm} long,

reflexed after anthesis, sparingly serrate or entire, the serratures minutely glandular: petals nearly orbicular, 8–10^{mm} in diameter, the upper margin erose, the claw at the base short and broad: stamens normally 10, about 5^{mm} long, the anthers purple: styles 3–5, surrounded at the base with pale hairs: fruit globose or subglobose, red, 9–13^{mm} in diameter, ripening and falling after the middle of September or early in October, the flesh soft and pleasant to the taste: nutlets 3–5, hard and bony, 6.5–8^{mm} long, 3.5–5^{mm} measured dorso-ventrally, the lateral faces nearly plane and the back grooved and ridged.

Cratægus frugiferens is common in thin, sandy or rocky soil near Cullman, Alabama, and has been gathered in similar situations on Lookout Mountain near Gadsden, Alabama; Red Mountain, Birmingham, Alabama, and in other places in the northeastern and upper central portions of the state. The new species is related to *C. aprica*[26] and *C. sororia*[27] differing from the former in the sharply serrate borders of the leaves, purple anthers, glabrous calyx and shorter spines, and from the latter by the number of stamens, glabrous calyx and the smaller and deeper colored fruit.

The type specimens, flowers and fruit from the same individual, are preserved in the Biltmore Herbarium.

Cratægus ignava n. sp.

A small tree 3–4^{m} tall or more frequently a much-branched shrub with one or more stems: bark ashy-gray or gray tinged with brown, frequently blackened near the base, the surface fissured and broken into numerous plate-like scales: branches ascending, armed with stout, gray or chestnut-brown spines 2–3.5^{cm} long, the bark smooth, gray tinged with brown or reddish-brown: winter buds globular, bright reddish-brown: leaves, which are almost fully grown at flowering time, 2.5–6.5^{cm} long including the petiole, 1–3^{cm} wide, glabrous or with a few hairs along the midrib and principal veins, firm to subcoriaceous in texture, bright green and fading to tones of yellow and brown; they vary from obovate to ovate in outline, or occasionally round-ovate, acute at the apex, either wedge-shaped or more abruptly contracted at the base and prolonged into margined, glandular petioles 5^{mm}–1.5^{cm} long, the borders sharply and irregularly serrate and incisely lobed above the middle of the blade, and less sharply serrate towards the base, the serra-

[26] Bot. Gaz. **30**: 335, 1900.
[27] Bot. Gaz. **30**: 336, 1900.

tures minutely glandular-apiculate: flowers, which expand in the vicinity of Valley Head, Ala. (type locality), early in May, produced in nearly simple, glandular-bracteate, mostly 3–5-flowered corymbs: pedicels glabrous or with a few weak, caducous hairs, 1–2^{cm} long, bearing one or more pectinately-glandular caducous bractlets: calyx obconic, glabrous, the divisions 4–5.5^{mm} long, serrate or glandular serrate, reflexed after anthesis: petals 6–8^{mm} long and of about the same width, the claw at the base relatively broad and short: stamens normally 20, 3–5^{mm} long, the anthers purplish: styles 3-5, surrounded at the base with pale hairs: fruit globose or subglobose, 8–12^{mm} in diameter, red or orange red, ripening and falling the last of September and early in October, the cavity 3.5–4^{mm} wide surrounded by the remnants of the calyx lobes and filaments: nutlets hard and bony, 5.5–6.5^{mm} long, about 3^{mm} thick measured dorso-ventrally, the back ridged and grooved and the lateral faces nearly plane.

Cratægus ignava grows abundantly on Lookout Mountain, above Valley Head, Alabama, and in similar situations at Collinsville and Gadsden, Alabama, and, while known to the writer for some time, its marked unfruitfulness during three seasons has rendered its full and comparative study of slow progress. The new species belongs to that section of the "flava group" characterized by twenty stamens and red fruit, and is easily contrasted with *C. sororia*, l. c., a member of the same section and group. The most prominent points of distinction are apparent in the relative size of the fruits and nutlets and the glabrous or nearly glabrous pedicels of the former and the more pubescent character of the same organs in the last named species.

The type material is preserved in the Biltmore Herbarium.

Cratægus segnis n. sp.

A tree 5–7^{m} tall with very rough, dark colored bark: trunk 1–1.5^{dm} in diameter, dividing 1–3^{m} above ground into large, spreading and crooked branches which are clothed with dark gray or reddish-brown bark: spines stout and short, 1–2^{cm} long, gray or reddish-brown: leaves, which are almost fully grown at flowering time, firm to subcoriacous in texture, 2–5.5^{cm} long including the petiole, 1–3.5^{cm} wide, bright green in color, fading to tones of yellow and brown; they are sparsely pubescent on both surfaces at the time of unfolding, especially along the midrib and ascending veins, soon glabrous or with a few hairs in the axils; in outline obovate, round-ovate or infrequently orbicular, acute at the apex, or rounded

with a short, sharp point, either rounded or narrowed at the base and prolonged into a glandular, pubescent but eventually glabrate petiole 5^{mm}–2^{cm} long; the borders are crenate, crenate-dentate, or obscurely serrate, the teeth or serratures glandular-apiculate, or sometimes deeply toothed or slightly lobed near the apex: flowers, which expand in the vicinity of Greenville, Alabama (type locality), about the middle of April, 12^{mm}–1.5^{cm} broad, produced in small, mostly 3–5-flowered or occasionally 7-flowered, simple corymbs: pedicels 5^{mm}–1^{cm} long, pilose, bearing a few glandular or pectinately-glandular, caducous bractlets; calyx obconic, sparingly pilose, the divisions 3–5^{mm} long, serrate, reflexed after anthesis: petals small, a little broader than long, about 6–7^{mm}, the claw at the base short and relatively broad: stamens normally 20, 3–5^{mm} long: styles 3–5, surrounded at the base with pale hairs: fruit red, globose, 8–12^{mm} in diameter, ripening and falling after the middle of September: nutlets 3–5, hard and bony, 6–7^{mm} long, 3.5–4.5^{mm} measured dorso-ventrally, the back ridged and grooved and the lateral faces nearly plane.

Cratægus segnis is related to *C. sororia*, l. c., and may be contrasted by the much smaller flowers, fruits and nutlets and the outline and borders of the leaves. It is known to me only from the region adjacent to Greenville, Alabama, where numerous individuals of great age testify to its slow growth and longevity.

The type material, consisting of fruit and flowers from the same individual, is preserved in the Biltmore Herbarium.

Cratægus quaesita n. sp.

A tree occasionally 5–7^{m} tall with a short trunk 1–1.5^{dm} in diameter, or more often a large branching shrub with one or several stems: bark of the trunk and larger branches ashy-gray or frequently much blackened at the base, fissured and broken on the surface into small scaly plates: of the branchlets gray, tinged with reddish-brown, the growth of the season at first pubescent, but eventually glabrous, reddish-brown in color: spines short and stout, 2–3^{cm} long, gray or chestnut-brown: leaves obovate or cuneiform, 1.5–6^{cm} long, including the margined, glandular petiole, 1–3^{cm} wide, or even larger on vigorous shoots, a little pubescent at the time of unfolding, soon glabrous or with a few hairs on the petiole and along the midrib, bright

glossy green when mature, firm to subcoriaceous in texture, fading in autumn to tones of yellow and brown with occasional dashes of red; they are rounded at the apex and with an abrupt short point or shallowly several lobed or occasionally simply pointed and acute, the borders serrate or crenate, either cuneate at the base or more abruptly contracted into a petiole 5mm–2cm long: flowers produced when the leaves are about half-grown, cup-shaped, 12–16mm in diameter, the corymbs 1–5-flowered, expanding in the region of River Junction, Florida (type locality), about the first of April: pedicels 5–12mm long, pubescent, bearing one or more narrow, glandular or pectinately-glandular caducous bractlets: calyx obconic, sparingly pubescent, the divisions glandular or glandular-serrate, 3.5–5mm long, reflexed after anthesis: petals nearly orbicular, 6–9mm in diameter, erose, the claw at the base relatively broad and short: stamens normally 20, 3–5mm long, the anthers light purple: styles 3–5, surrounded at the base with pale hairs: fruit, which ripens and falls about the middle of September, subglobose or slightly pyriform, red and orange, 8–11mm in diameter, 9–13mm high, the cavity 3–4mm wide: nutlets 3–5, hard and bony, about 7mm long, 3–4mm measured dorso-ventrally, the lateral faces nearly plane and the back sometimes bearing grooves and ridges.

Cratægus quaesita is probably best contrasted with *C. segnis* above proposed, from which it may be known by the more pubescent corymbs, more glandular and less deeply incised calyx segments, longer pedicels and lighter colored and elongated fruit.

The type material is preserved in the Biltmore Herbarium.

Cratægus consanguinea n. sp.

A tree 5–7m high with a clear trunk dividing 2–3m above ground into several stout, ascending or spreading branches, or a large much-branched shrub with one or more stems: bark of the trunk and larger branches dark ashy-gray or even much blackened, fissured, the surface being broken into numerous plate-like scales; of the branchlets gray or reddish-brown, the growth of the season at first pubescent, soon becoming smooth and marked by small pale lenticels: spines short and stout, 1.5–3cm long, gray or chestnut-brown, or occasionally larger on the older branches or main axis: leaves obovate, round-ovate or nearly

orbicular in outline, 2–6^{cm} long including the petiole, 1–4^{cm} broad, or even larger on vigorous shoots, slightly hairy at the time of unfolding, especially along the petiole and principal veins, which retain more or less of the pubescence even in age, otherwise soon becoming glabrous, thin to firm in texture, bright green; they are mostly acute at the apex, irregularly serrate and incisely lobed, contracted at the base and prolonged into a margined, glandular petiole 1–2^{cm} long: flowers, which appear when the leaves are more than half-grown, borne in simple, bracted 1–5-flowered corymbs, and expand at Tallahassee, Florida (type locality), after the middle of March: pedicels finely pubescent, 5^{mm}–1.5^{cm} long, bearing one or more pectinately-glandular, caducous bractlets: calyx obconic, sparsely pubescent, the divisions pectinately-glandular or glandular-serrate, 4–5^{mm} long, reflexed after anthesis: petals erose, 8–10^{mm} across, with a short, broad claw at the base: stamens normally 20, 5–7^{mm} long, the anthers purplish: styles 3–5, surrounded at the base with pale hairs: fruit globose or depressed globose, red, 9–12^{mm} broad, ripening and falling about the middle of September: nutlets 3–5, hard and bony, 7–8^{mm} long, 4–5^{mm} measured dorso-ventrally, the lateral faces nearly plane and the back ridged and grooved.

Cratægus consanguinea is related to *C. sororia*, l. c., from which it may be known by the thinner and less pointed leaves, color of the anthers and smaller and duller colored fruit. The proposed species thrives in the woodlands east of Tallahassee and extends westward to the valley of the Chatahoochee River.

The type material is preserved in the Biltmore Herbarium.

Cratægus condigna n. sp.

Arborescent, 4–6^{m} tall, with a short trunk 1–1.5^{dm} in diameter, or more frequently a large shrub with one or more stems: bark of the trunk or larger branches ashy-gray or frequently blackened, fissured and scaly; of the branchlets gray, or tinged with reddish-brown, the growth of the season at first pubescent: spines 5^{mm}–2^{cm} long or more, gray or chestnut-brown: leaves obovate, cuneate, or on the shoots broadly obovate, 1–4^{cm} long including the petiole, 7^{mm}–2.5^{cm} broad, either rounded and with one or more short points, or these obsolete, or acute at the apex, wedge-shaped or more abruptly narrowed at the base, the petiole

3mm–1cm long: they are pubescent at the time of unfolding, especially the petioles and principal veins, becoming glabrate with age, the borders crenate or crenate-dentate, particularly so above the middle of the blade, usually serrate and glandular near the base, bright glossy green when mature, firm to subcoriaceous in texture, fading in autumn to tones of brown and yellow: flowers produced in simple, mostly 1–3-flowered corymbs, expanding in the vicinity of River Junction, Florida (type locality), the last of March or first of April, and when the leaves are nearly fully grown: pedicels 4mm–1cm long, tomentose-pubescent, bearing one or more narrow deciduous bractlets: calyx obconic, tomentose-pubescent, the segments glandular-serrate, 3.5–5mm long, reflexed after anthesis: petals nearly orbicular, with a broad, short claw at the base: stamens normally 20, 3–4mm long: styles 3–5, surrounded at the base with pale hairs: fruit subglobose or pyriform, red and orange or greenish, 7–9mm wide, 8–11mm high, ripening and falling early in September: nutlets 3–5, hard and bony, 5–6mm long, about 4mm measured dorso-ventrally, the lateral faces nearly plane and the back shallowly grooved and ridged.

Cratægus condigna is represented in many herbaria, the following specimens being noted: Chapman, Florida; Curtiss No. 5982, River Junction, Fla.; C. S. Sargent, Chattahoochee, Fla., 1900; Biltmore Herbarium, River Junction, Fla., 1899, and Tallahassee, Fla., 1900. The species now proposed represents one of the many forms which have served as *C. flava* Ait.,[28] a name, when correctly applied, properly belonging to a different plant.

The type material is preserved in the Biltmore Herbarium.

Cratægus lepida n. sp.

A small and very spiny shrub, seldom averaging more than 1–1.5m tall, with drooping branches: bark gray or tinged with reddish-brown: branches slender, recurved, zigzag, the internodes very short: spines very numerous, 1–2.5cm long, gray or chestnut-brown: leaves very small, 5mm–2.5cm long including the petiole, 3.5mm–2cm wide, pubescent and glandular at the time of unfolding, becoming glabrous and lustrous on the upper surface, pale green on the lower side and with more or less pubescence, especially along the petiole, principal veins and in their axils; they vary from obovate, round-ovate or nearly orbicular to spatulate in out-

[28] Hort. Kew. 2: 169, 1789.

line, either rounded, truncate or short pointed at the apex, contracted at the base or sometimes cuneate and prolonged into a margined glandular petiole 2mm–1cm long, the borders crenate or dentate or glandular-serrate and slightly lobed near the apex and little more than glandular at the base, fading in early autumn with decided yellow and brown tints: flowers which appear early in April, solitary or in twos or threes: pedicels tomentose-pubescent, 2–7mm long, bearing one or more glandular or pectinately-glandular caducous bractlets: calyx obconic, more or less pubescent, the divisions 2–3mm long, glandular serrate or pectinately-glandular, usually coloring with the fruit: petals nearly orbicular, about 5mm in diameter: stamens normally 20, 3–3.5mm long: styles 3–5, surrounded at the base with pale hairs: fruit subglobose, about 7–11mm in diameter, orange or orange-red in color, ripening and falling in the vicinity of Waycross, Georgia (type locality), about the last of August: cavity 3–4mm wide, surrounded by the calyx segments and the remnants of the stamens, the tips of the nutlets exposed at the bottom at maturity: nutlets 3–5, hard and bony, 6–7mm long, 3–4mm measured dorso-ventrally, the back either smooth or shallowy grooved, the lateral faces nearly plane.

Cratægus lepida is a remarkably neat and graceful shrub, an inhabitant of the sandy soil of southeastern Georgia and northeastern Florida, and is represented in the Herbarium from Darien and Waycross, Georgia, and Jacksonville, Florida. The species belongs to that section of the "flava group" characterized by small, glossy leaves and very few-flowered corymbs.

Type material is preserved in the Biltmore Herbarium.

Cratægus invicta n. sp.

A shrub 1–1.5m tall with zigzag, recurved and very spiny branches, clothed with gray bark which is usually more or less tinged with reddish-brown: thorns slender, straight or slightly curved, 2.5–5cm long, gray or chestnut-brown in color: leaves, which are nearly fully grown at flowering time, spathulate or cuneate, on the vigorous shoots obovate or round-ovate, 5mm–2.5cm long including the short petiole, 3mm–1cm broad, or a little more in width on the shoots, either rounded and frequently shallowly lobed near the apex, or more acute with less conspicuous lobes, serrate or crenate-dentate, the teeth glandular-apiculate; they are somewhat pubescent at the time of unfolding, soon becoming

glabrous or with a little pubescence persistent along the petiole and prominent ascending veins or in their axils, glandular towards the base, bright green and lustrous on the upper surface, paler below, firm in texture, fading in autumn to tones of yellow and brown: flowers which expand about the last of April, solitary or produced in twos or threes: pedicels permanently tomentose, 4^{mm}–1^{cm} long, bearing one or more narrow, glandular, caducous bractlets: calyx obconic, tomentose, the segments, 3–4.5^{mm} long, glandular-serrate, reflexed after anthesis: petals nearly orbicular 4–5^{mm} in diameter, the claw at the base short and relatively broad: stamens normally 20, 3–4^{mm} long: styles 3–5, surrounded at the base with pale hairs: fruit pyriform, 6–8^{mm} wide, 8–11^{mm} high, the cavity 3–4^{mm} wide surrounded by the persistent calyx lobes and remnants of the stamens, the pedicels tomentose or pubescent: nutlets 3–5, hard and bony, about 7^{mm} long, 3–4^{mm} measured from the back to the inner angle, the lateral faces nearly plane and the back grooved and ridged.

Cratægus invicta was found in sandy soil near Doctortown, Georgia (type locality), and similar specimens were collected by Professor C. S. Sargent on his journey to Louisiana and Florida in 1886 at Way's Station, Georgia. The species just proposed has, on superficial examination, affinities with *C. uniflora* Muench,[29] but properly belongs to the "flava group." From *C. lepida* above described, it differs in the longer spines, pyriform, later ripening fruit, and more pointed and elongated leaves.

The type material is preserved in the Biltmore Herbarium.

Cratægus munda n. sp.

A small shrub with drooping branches frequenting the dry pine lands near Batesburg, South Carolina (type locality), seldom exceeding 1–1.5^{m} in height: bark dark gray tinged with reddish-brown: spines slender, straight or slightly curved, 1–4.5^{cm} long, gray or chestnut-brown: leaves spathulate or obovate in outline, 1–3^{cm} long including the petiole, 4^{mm}–1.5^{cm} wide, pubescent at the time of unfolding, becoming nearly glabrous or with traces of pubescence along the petiole and principal veins and in their axils; they are either rounded, frequently with an abrupt point at the apex, or more acute, narrowed towards the base and abruptly contracted into a short petiole, or cuneate, bright

[29] Muench. Hausv. **5**: 147, 1770.

glossy green, dentate or serrate, especially near the apex, fading in autumn with tones of yellow and brown: flowers which open about the middle of April, solitary or in twos or threes: pedicels pubescent, becoming glabrous or with a few hairs persistent: 3^{mm}–1^{cm} long, bearing one or more narrow, caducous bractlets: calyx obconic, sparingly pubescent, the divisions 3.5–5^{mm} long, serrate or glandular-serrate, reflexed after anthesis: petals nearly orbicular, 5–6^{mm} in diameter, the claw at the base relatively short and broad: stamens normally 20, 3–4^{mm} long: styles 3–5, surrounded at the base with pale hairs: fruit pyriform, 9–12^{mm} high, 7–9^{mm} wide, the cavity about 4^{mm} wide, surrounded by the persistent calyx lobes and remnants of the stamens: nutlets 3–5, hard and bony, about 7^{mm} long, 3–4^{mm} measured dorso-ventrally, the lateral faces nearly plane and the back grooved and ridged.

Cratægus munda, another form of the "flava group," with small, glossy leaves and in aspect somewhat similar to *C. uniflora*, l. c., is closely associated with *C. invicta* above proposed, from which it differs in the less pubescent foliage and pedicels, more sharply cut and scarcely lobed leaves, less spiny branches and rather larger fruit.

The type material is preserved in the Biltmore Herbarium.

Cratægus vulsa n. sp.

A tree 4–6^{m} tall with a trunk 1–2^{dm} in diameter branching 1–3^{m} above the ground, the ascending or spreading branches forming an oval, usually compact symmetrical head: or often a large shrub with one or several stems: bark of the trunk or stems gray tinged with brown, thin, fissured and scaly; of the branches smooth, the growth of the season glabrous, bright reddish-brown: spines stout, either straight or slightly curved, 2.5–4^{cm} long, or frequently of much greater size and compound on the trunk and larger branches, chestnut-brown or gray: leaves ovate, oval or round-ovate, the blades 1.5–7^{cm} long, 1–6^{cm} broad, glabrous or with a few hairs along the veins and in their axils, sharply and irregularly serrate and incisely lobed, acute at the apex, either rounded or abruptly narrowed at the base and extending into margined petioles 5^{mm}–2.5^{cm} long; they are thin to firm in texture, bright green, fading with decided tones of yellow and brown: flowers produced in glabrous, compound, 3–10-flowered corymbs, the lower branches arising from the axils of leaves, appearing in

the vicinity of Gadsden, Alabama (type locality), the latter part of April and when the leaves are almost fully grown: pedicels glabrous, 8mm–1.5cm long, bearing one or more narrow, sparingly if at all glandular, caducous bractlets: calyx obconic, glabrous, the divisions 2.5–3.5mm long, nearly or quite entire, reflexed after anthesis: petals 6–7mm in diameter, the upper margins usually erose: stamens normally 20, 3–4mm long, the anthers purplish: styles 3–5, surrounded at the base with pale hairs: fruit globose, 7–9mm in diameter, yellowish-green flushed with red, ripening the last of September and early in October: nutlets 3–5, hard and bony, 5–6mm long, 3–4mm measured dorso-ventrally, the ventral faces nearly plane and the exterior surface very slightly grooved and ridged or even smooth.

Cratægus vulsa is distributed from the "flat-woods" south of Gadsden, Alabama, to the valley of Horseleg creek at Rome, Georgia, prefering rich, moist soil. The proposed species is closely related to *C. viridis* L.[30] (*C. arborescens* Ell[31]), but may be distinguished by the broader, relatively shorter and more finely serrate and less incised leaves (which do not bear such large conspicuous tufts of hairs in the axils of the veins as is so frequently noticeable in the latter species) the larger, paler colored fruits and coarser seeds.

The type material, composed of fruit and flowers from the same tree, is preserved in the Biltmore Herbarium.

Cratægus opima n. sp.

Arborescent, 4–7m tall, with a trunk 1–2dm in diameter, branching 2–4m above ground, the spreading or ascending branches forming an oval or round usually open head; or frequently a much-branched shrub with one or more stems: bark ashy-gray, usually blackened near the base and on the branches tinged with brown and red, the growth of the season glabrous, bright reddish-brown, marked with small, pale lenticels: spines 1–3cm long or larger and branched on the trunk and older branches, straight or curved, gray or chestnut-brown: leaves oval, ovate or orbicular, 2.5–7cm long including the petioles, sharply and irregularly serrate and incisely lobed, acute at the apex, contracted at the base (frequently rounded or sub-truncate on the shoots) and tapering into slender, slightly margined petioles 7mm–2.5cm long, glabrous, or with a sprinkling of short hairs along the veins,

[30] Sp. Pl. 476, 1753.

[31] Bot. S. C. & Ga. I: 550, 1821.

especially upon the upper surface when young, thin to firm in texture, bright green above, paler below, fading in autumn with decided tones of yellow and brown: stipules linear, either straight or falcate, glandular or pectinately-glandular, or broader and glandular-serrate on vigorous shoots, caducous: flowers, which appear when the leaves are nearly fully grown, produced in simple, glabrous, bracteate corymbs, and expand in the vicinity of Greenville, Alabama (type locality), before the middle of April: pedicels glabrous, 6^{mm}–1.5^{cm} long, bearing a few narrow, glandular, deciduous bractlets: calyx glabrous, obconic, the divisions 2–3.5^{mm} long, sparingly glandular-serrate or entire, slightly pubescent on the inner surface, reflexed after anthesis: petals 6–7^{mm} wide, nearly orbicular or even longer than broad, the margin above usually erose: stamens normally 20, 4–6^{cm} long, the anthers purple: styles 3–5, surrounded at the base with pale hairs: fruit globose, bright red, 5–8^{mm} in diameter, ripening the first of October and usually persisting for a brief period: nutlets 3–5, 3.5–4.5^{mm} long, 2.5–3^{mm} measured dorso-ventrally, the ventral faces nearly plane and the back faintly grooved and ridged.

Cratægus opima is frequently loaded with the small highly-colored pomes, and in such condition is a striking and pretty object. Abundantly distributed in the region about Greenville, Alabama, the form has also been collected at other points in the same general region of the state. From the characters of the fruit it suggests *C. viridis* L., l. c. (*C. arborescens* Ell.), l. c., a species however, with which it differs widely, as exemplified in the instance of the former by the simple corymbs and more circular, short pointed leaves. Contrasted with *C. pulcherrima* Ashe,[32] with which it is more closely related, the new species may be distinguished by the round, highly colored fruit, border and relatively shorter leaf-blades with less deeply incised borders and later time of flowering.

The type material, composed of fruit and flowers from the same tree, is preserved in the Biltmore Herbarium.

Cratægus incilis n. sp.

Arborescent, 5–7^{m} tall, with a trunk 1–1.5^{dm} in diameter dividing 1–2.5^{m} above ground into several stout, ascending or spreading branches, or a large branching shrub with one or several stems: bark of the trunk and larger branches gray, more or less tinged with brown and usually blackened near the base; of the branchlets

[32] Jour. Elisha. Mitchell Soc. **16**: 77, 1900.

gray with tinges of reddish-brown, the growth of the season glabrous, bright reddish-brown, marked with small pale lenticels: spines slender, 1–4^{cm} long, gray or chestnut-brown, or on the older branches and trunk compound and of larger size: leaves ovate, ovate-oblong or oval, 2.5–9^{cm} long including the petioles, 1–5.5^{cm} broad, glabrous, thin to firm in texture, bright green above, paler below and displaying 4–6 pairs of prominent veins; they are acute at the apex, narrowed at the base, often abruptly so, or on the shoots either rounded or nearly truncate, the borders irregularly serrate and incisely 6–10-lobed or cleft: flowers, which appear when the leaves are about two-thirds grown, produced in mostly 5–10-flowered sub-simple corymbs, and expand in the vicinity of Evergreen, Alabama (type locality), before the middle of April: pedicels glabrous, 1–2.5^{cm} long, bearing one or several narrow pectinately-glandular, caducous bractlets: calyx obconic, glabrous, the divisions 3–4^{mm} long, 1–2^{mm} broad, usually serrate near the summit, reflexed after anthesis: petals nearly orbicular, 6–8^{mm} in diameter, the upper borders more or less erose: stamens normally 20, 4–5^{mm} long, the anthers purple: styles 3–5, surrounded at the base with pale hairs: fruit which ripens and falls the last of September or early in October, globose, red or red and green, 5–9^{mm} in diameter, the cavity very prominent, 2.5–4^{mm} across, surrounded by the remnants of the calyx lobes and filaments, or the former frequently fully persistent: nutlets 3–5, usually 3, 4.5–6^{mm} long, 2.5–3.5^{mm} measured dorso-ventrally, the back slightly ridged and grooved and the lateral faces nearly plane.

Cratægus incilis is abundant along the borders of swamps, usually in clayey soil, at Evergreen, Alabama. The proposed species differs from *C. opima* previously described, in the elongated, many-cleft or incised leaves, the stouter and larger pedicels and duller colored fruit, and from *C. pulcherrima* Ashe, l. c., in the shape and color of the fruit, the longer and stouter pedicels and more elongated leaves.

The type material (fruit and flowers from the same tree), is preserved in the Biltmore Herbarium.

Cratægus signata n. sp.

A tree seldom exceeding a height of 5–6^{m}, with a slender trunk dividing 2–3^{m} above ground into several spreading or ascending branches, the whole forming an oval or round, com-

pact head; or frequently a large, much-branched shrub with one or more stems: bark of the trunk and larger stems ashy-gray, usually blackened near the base, rough; of the branches and branchlets gray tinged with brown, the growth of the season at first pubescent, becoming glabrous, bright reddish-brown: spines stout, gray or chestnut-brown, 2.5–4.5^{cm} long, or more: leaves obovate or, on the shoots, oval, either rounded and frequently with a short abrupt point at the apex, or more acute, sharply and irregularly serrate, especially above the middle, on the shoots more sharply serrate and sometimes incisely lobed; pubescent at the time of unfolding and even so at maturity, but the covering rather soft and inconspicuous, bright green in tone, firm in texture, displaying 3–5 pairs of prominent ascending veins: flowers which appear when the leaves are almost fully grown, produced in pilose-pubescent, branched corymbs, and expand in the vicinity of Mobile, Alabama (type locality), in April: pedicels pubescent, 5^{mm}–1.5^{cm} long, usually bearing one or more narrow, glandular, caducous bractlets: calyx obconic, pubescent, the divisions 4–6^{mm} long, glandular serrate, reflexed after anthesis: petals nearly orbicular or a little longer than broad, 6–9^{mm} wide, the upper borders erose: stamens normally 10, about 5^{mm} long: styles 3–5, surrounded at the base with pale hairs: fruit oval or oblong, 9–14^{mm} long, 7–10^{mm} wide, red, more or less pruinose, punctate, ripening and falling the latter part of October: nutlets 3–5, hard and bony, 7–8^{mm} long, 3–4^{mm} measured dorso-ventrally, the back prominently ridged and grooved and the ventral faces nearly plane.

Cratægus signata, an inhabitant of open, mostly dry copses of Southern Alabama, has been generously distributed by Dr. Charles Mohr from collections made from the vicinity of Mobile. From *C. ashei*[33] the proposed species differs in the number of stamens, narrower calyx segments, shape of fruit and time of ripening, and from *C. alabamensis*[34] in the number of stamens, size of fruit and later period of maturity.

The type sheet is preserved in the Biltmore Herbarium.

Cratægus teres n. sp.

A tree 5–6^{m} tall, with a short trunk, or more often a large much-branched shrub with one or more stems: bark of the

[33] Bot. Gaz. **30**: 339, 1900. [34] Bot. Gaz. **30**: 342, 1900.

trunk and larger branches dark ashy-gray, usually blackened near the base, rough; of the branches gray tinged with reddish brown, the growth of the season bright reddish-brown, marked with small lenticels: spines stout, gray or chestnut-brown, 2.5–3.5^{cm} long: leaves obovate or broadly cuneiform, on the shoots frequently broadly obovate or elliptical, 2–6.5^{cm} long, including the petioles, 5^{mm}–4^{cm} broad, either rounded at the apex and often with a short and abrupt point or truncate, the base wedge-shaped or more abruptly narrowed and extending into gland-bearing, margined petioles, 5^{mm}–1.5^{cm} long; they are glabrous or with a few hairs when very young, bright glossy green, firm in texture, the margins irregularly serrate or finely serrate-dentate: flowers, which appear when the leaves are nearly fully grown, produced in glabrous or very sparsely weak-hairy 3–10-flowered simple or compound corymbs, 12–15^{mm} in diameter, opening in the vicinity of Montgomery, Alabama (type locality), early in April: pedicels 6^{mm}–1.5^{cm} long, glabrous or with a few weak hairs, bearing one or more narrow, glandular, caducous bractlets: calyx obconic, glabrous, the divisions very long and narrow, 4.5–6^{mm} long, .5–.75^{mm} wide or slightly more in mature fruit, glandular-serrate, reflexed after anthesis: petals orbicular or rather longer than broad, 6–7^{mm} wide, the claw at the base relatively short and broad, the upper borders erose: stamens normally 20, 4–5^{mm} long, the anthers light yellow: styles mostly 2–3, surrounded at the base with pale hairs: fruit oblong, red, 1–1.5^{cm} long, 8^{mm}–1^{cm} broad, ripening and falling by or before the middle of August: nutlets usually 2–3, 8–9^{mm} long, 3–4^{mm} measured dorso-ventrally, hard and bony, the back grooved and ridged and the ventral faces nearly plane.

Cratægus teres is possibly best contrasted with *C. alabamensis*, l. c., from which it differs mainly in the glabrate corymbs, leaves and shoots and the smaller fruit. The original specimens, which are preserved in the Biltmore Herbarium, were gathered in pine woods near Montgomery, Alabama.

Cratægus sinistra n. sp.

A small tree 4–5^{m} tall, with a slender trunk seldom more than 1^{dm} in diameter, clothed with scaly dark gray bark which is frequently tinged with brown and much blackened near the base; or more frequently a large much-branched shrub with one

or several stems: branches crooked, spreading or ascending, forming a round or flat-topped head, the bark gray, tinged with brown: branchlets zigzag, the growth of the season at first pubescent, becoming glabrous, bright reddish brown, marked by elongated, pale lenticels: spines 1–6^{cm} long, straight or slightly curved, gray or chestnut-brown: winter buds globular, bright reddish-brown, the scales of the terminal ones spreading, acute or acutish: leaves obovate or occasionally oval or elliptical, 2–5^{cm} long including the pubescent, scarcely if at all glandular petioles, 8^{mm}–3^{cm} wide, pale green and pubescent at the time of unfolding, becoming glabrous or glabrate, bright green and lustrous on the upper surface, below much paler and with some persistent pubescence especially along the midrib and rather inconspicuous ascending veins; they are mostly rounded but occasionally pointed at the apex, either narrowed or cuneate at the base and prolonged into margined petioles 3–7^{mm} long, sharply and irregularly serrate above the middle, or frequently obscurely serrate or even entire: stipules linear, not exceeding 1^{cm} in length, except on very vigorous shoots, when they are broader and longer, more or less glandular, caducous: flowers, which appear when the leaves are two-thirds or more grown, borne in pilose-pubescent, branched, 7–15-flowered corymbs, and expand in the vicinity of West Nashville, Tennessee (type locality), early in May: pedicels pilose-pubescent, 5^{mm}–1.5^{cm} long, bearing one or more very narrow, sparingly glandular, caducous bractlets: calyx obconic, pilose, the divisions 3–4^{mm} long, entire, bearing a number of weak, pale hairs similar to those of the tube and pedicels: petals nearly orbicular, about 6^{mm} in diameter, the claw at the base short and relatively broad: stamens normally 10, 4–5^{mm} long, the anthers purple: styles one or two, surrounded at the base with pale hairs: fruit oval, 9–12^{mm} long, 6–8^{mm} wide, reddish, red and green or with yellowish surfaces where not exposed and brownish red cheeks, flesh thin and greenish, the cavity 2–2.5^{mm} across, ripening and falling the last of October and early in November: nutlets 1–2, hard and bony, 7–8^{mm} long, 4–5^{mm} thick when solitary and presenting one or more grooves and low ridges, or 3–4^{mm} measured dorso-ventrally when in pairs, the ventral faces nearly plane and the back grooved and ridged.

Cratægus sinistra is evidently related to *C. engelmanni* Sarg,[35] from which, as exemplified by the original specimens from Missouri, it differs in the smaller, oval fruit, the smaller flowers and leaves and more densely and harshly pubescent corymbs and foliage. From *C. berberifolia* T. & G.,[36] the proposed species may be recognized by the fewer stamens and the smaller, less succulent and elongated fruit.

The type material is preserved in the Biltmore Herbarium.

Cratægus tetrica n. sp.

A tree 5–7^{m} tall, with a short trunk 1–2^{dm} in diameter, dividing 1–3^{m} above the ground into several spreading or ascending branches, forming an oval, round or occasionally flat-topped head; or more frequently a large shrub with one or several stems: bark of the trunk or larger stems fissured and scaly, dark brown or dark ashy gray tinged with brown; of the branches smooth, gray or with mingled tones of brown, the growth of the season pilose-pubescent, becoming glabrous during the latter part of the first or early in the second season, bright reddish-brown marked with numerous small pale lenticels: spines very stout, 1.5–5^{cm} long, either curved or straight, dark gray or bright chestnut-brown: winter buds globose or oval, the outer scales of the terminal ones with relatively long cuspidate tips, bright reddish-brown: stipules linear or on the stronger shoots lunate, serrate or dentate with long, divergent cuspidate or glandular teeth, caducous: leaves broadly oval or broadly obovate, 3–7^{cm} long, including the petiole, 1.5–4.5^{cm} wide, rounded at the apex, frequently pointed on vigorous shoots, abruptly narrowed at the base and prolonged into pubescent, margined, sometimes glandular petioles 5^{mm}–1^{cm} long; they are sharply and irregularly serrate, especially above the middle, entire near the base, pubescent on both surfaces at the time of unfolding, becoming glabrous or glabrate and dark green and lustrous on the upper surface, below pale green, the pubescence persistent along the midrib, petiole and principal, 4–6 pairs of ascending veins, coriaceous, fading in autumn with tones of yellow, brown and red: the flowers, which appear when the leaves are almost or quite fully grown, expand in the vicinity of Nashville, Tennessee (type locality), before the middle of May and are borne in compound, pilose-pubescent 10–20-flowered corymbs: pedicels 5^{mm}–1.5^{cm} long,

[35] Bot. Gaz. **31**: 2, 1901. [36] Flora N. Am. **1**: 469, 1838.

pilose-pubescent, bearing one or more narrow, glandular, caducous bractlets: calyx obconic, pilose-pubescent, the divisions about 4^{mm} long, entire or nearly so, reflexed after anthesis: petals nearly orbicular, $5–6^{mm}$ broad, the claw at the base broad and short: stamens normally 10, $4–5^{mm}$ long, the anthers purplish: styles usually 2, surrounded at the base with pale hairs: fruit globose, $7^{mm}–1^{cm}$ in diameter, red or yellowish green with red cheek, ripening the last of September or early in October, the cavity about 3^{mm} in diameter, surrounded by the calyx lobes and remnants of the filaments: nutlets mostly in pairs, occasionally single, very thick-walled and hard, $6–8^{mm}$ long, $3–4^{mm}$ measured dorso-ventrally, the ventral faces nearly plane and the back prominently ridged and grooved.

Cratægus tetrica is a common species on the limestone hills about Nashville, Tennessee, and is related to *C. sinistra* above proposed and to *C. engelmanni*, Sargent, l. c. It may be distinguished from the former by its greater size, larger leaves, round fruit and earlier period of ripening. From the last named species it may be recognized by the broader and more abruptly narrowed leaves, more persistent and harsh pubescence of the foliage and inflorescence, smaller flowers (1.5^{cm} or less in diameter) and more floriferous corymbs. *C. berberifolia* T. & G., l. c., differs from the species just described by having narrower leaves with cuneate bases and flowers with more numerous stamens.

The type material, consisting of flowers and fruit from the same tree, is preserved in the Biltmore Herbarium.—C. D. Beadle.

Biltmore Herbarium,
Biltmore, N. C.

A SHRUBBY OAK OF THE SOUTHERN ALLEGHANIES

Quercus boyntoni n. sp.

A shrub $1–5^{m}$ tall, usually growing in large clumps or occasionally with the aspect of a small tree with a short trunk less than 1^{dm} in diameter, common on Lookout Mountain at elevations between 250 and 300 meters, near Gadsden, Alabama. Leaves obovate in outline, $5–9^{cm}$ long, $1.5–4^{cm}$ broad, with 3–5 small obtuse lobes above the middle, but usually near the summit of the blades or nearly entire, the apex obtuse, cuneate or narrowed from the lower lobes to the base and prolonged into short petioles $5^{mm}–1^{cm}$ long; they are tomentose at the time of unfolding, especially and permanently so on the lower surface or along the

midrib and prominent veins, soon becoming glabrous and lustrous above, coriaceous or slightly thinner in texture, fading in autumn with tones of yellow and brown: stipules linear, 3–5^{mm} long, pubescent, caducous: staminate flowers borne in aments 5–8^{cm} long from terminal and lateral buds of the previous season's growth, the perianth mostly but irregularly 5-lobed, pubescent: stamens normally 5, both the anthers and filaments pubescent: pistillate flowers from the axils of leaves of the growth of the season, either solitary, in pairs or in clusters of three, sessile or short-pedunculate, clothed with pale hairs, the stigmas purplish-red: acorns sessile or short pedunculate, the brown nut oval or obovoid, about 12^{mm} high, 9–10^{mm} wide, obtuse, clothed with pale tomentum at the apex and with longitudinal narrow dark-colored stripes: cup turbinate or cup-shaped, enclosing less than one-half of the nut, pubescent inside, the outer surface more densely so and displaying the acute or acutish tips of the closely imbricated scales. Bark of the older stems gray, usually with tinges of brown and black, fissured and broken on the surface into appressed irregular scales; of the branches dark gray or much blackened, marked by numerous small, pale lenticels, the growth of the season at first densely clothed with pale yellowish-brown tomentum, usually becoming glabrous during the second year.

Evidently very closely related to *Quercus minor* (Marsh) Sarg.,[37] and, were it not for the fact that the Post Oak is distributed throughout the same region, developing the characteristic form and ordinary proportions and seemingly without any intergradations between the two, the species here proposed would probably have been regarded merely in the light of varietal rank. *Quercus boyntoni* is frequently loaded with fruit when only 1^{m} tall and presents an unique and striking appearance both on account of its small size and peculiar leaves. It is readily distinguished from the Post Oak, growing in the same region, by the small leaves which are lobed much above the middle of the blades and by their long, cuneate bases, and by evidences of maturity in individuals of diminutive size. *Quercus margaretta* Ashe,[38] a species from eastern North Carolina, differs from the form described above in the more lobed leaves with shorter bases and the more slender and glabrous or nearly glabrous shoots.

The original specimens were collected by Mr. C. L. Boynton of the Biltmore Herbarium, for whom the species is named, in April and October, 1900.

C. D. Beadle.

Biltmore Herbarium,
Biltmore, N. C.

[37] Gard. & Forest, **2**: 471, 1889.

[38] Journ. Elisha Mitchell Soc., 94, 1895.

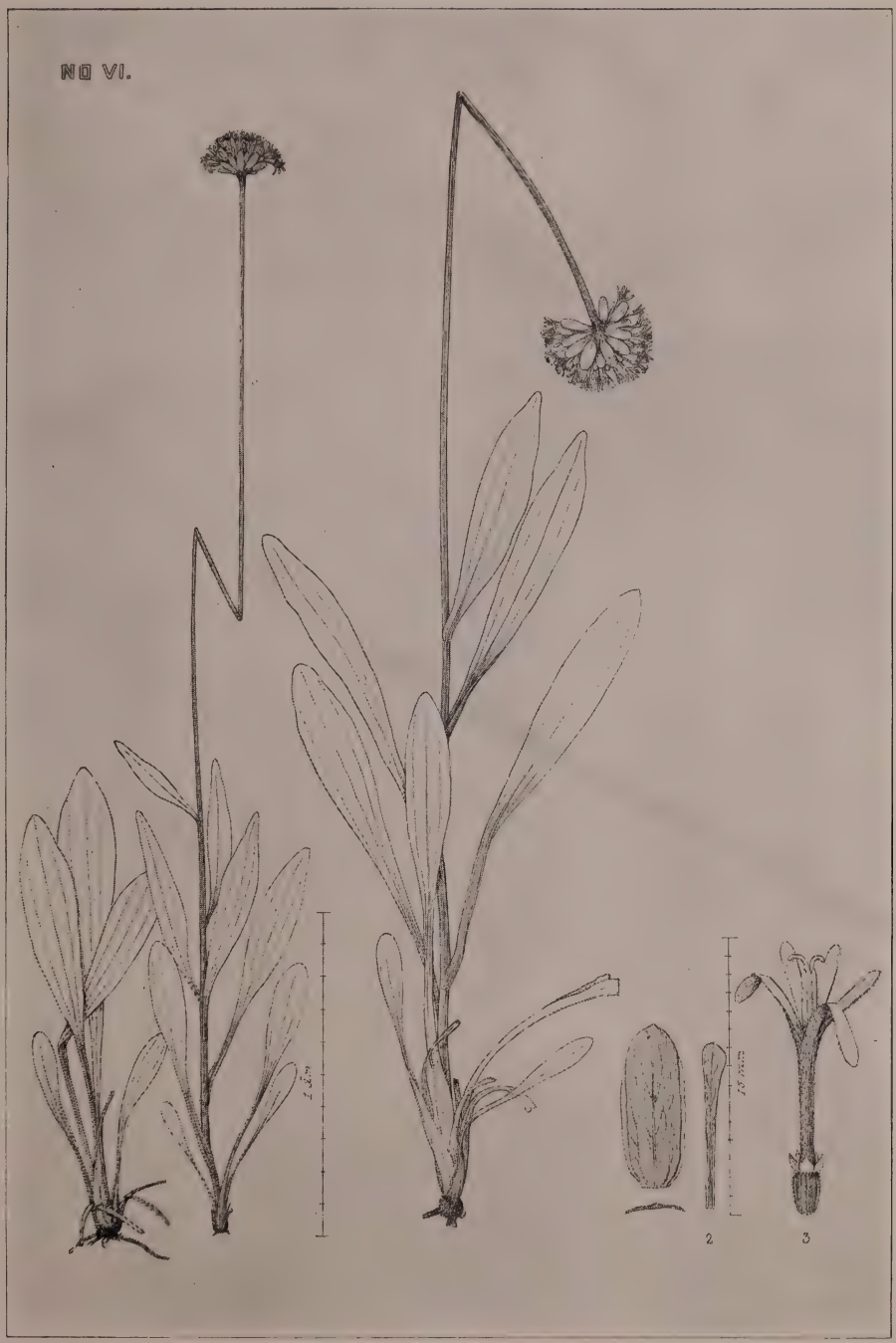
MARSHALLIA GRANDIFLORA n. sp.

MARSHALLIA RAMOSA n. sp.

MARSHALLIA MOHRI n. sp.

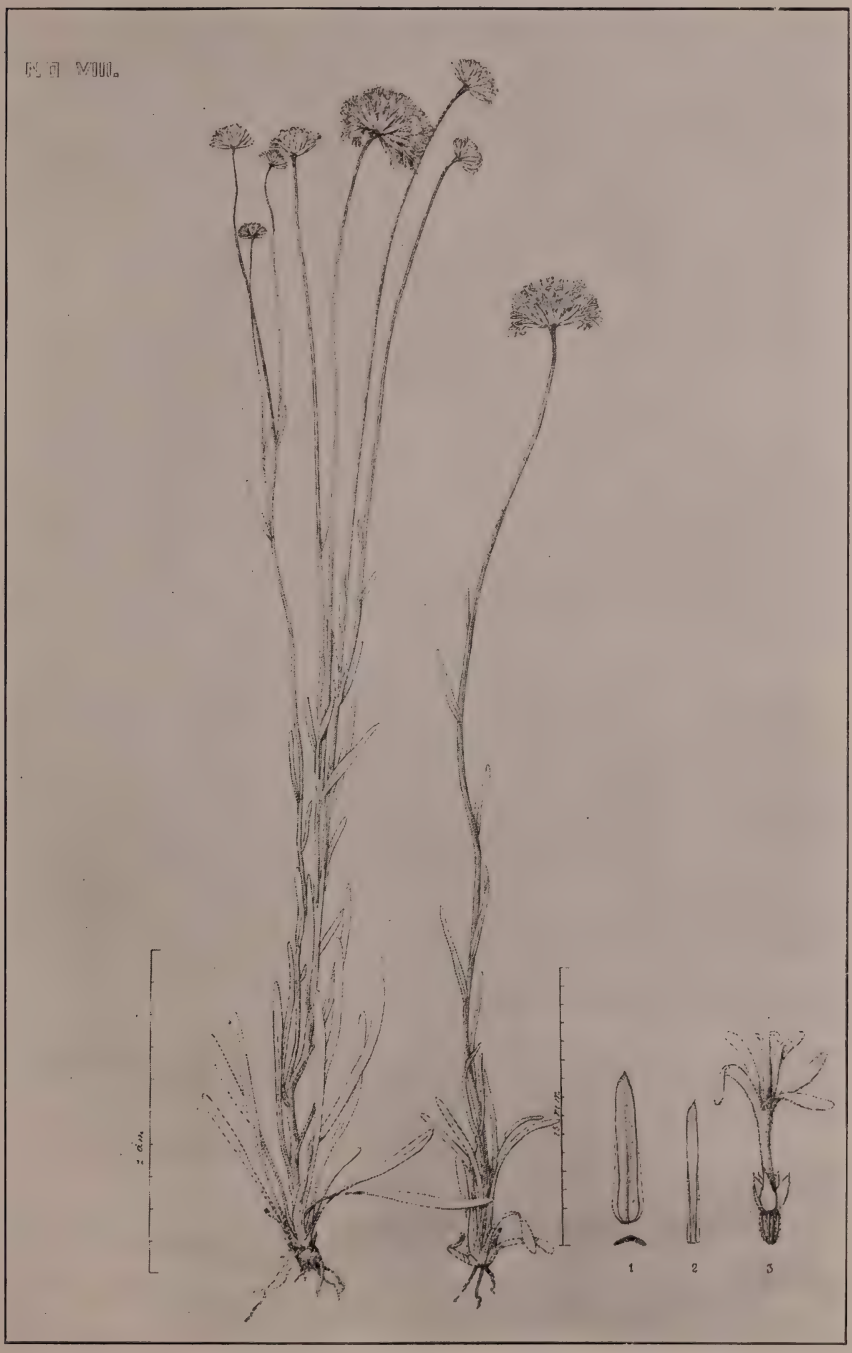
MARSHALLIA TRINERVIA (Walt.) Porter

MARSHALLIA OBOVATA (Walt.)



MARSHALLIA OBOVATA PLATYPHYLLA (Curtis)

MARSHALLIA CÆSPITOSA Nutt.



MARSHALLIA CÆSPITOSA SIGNATA n. var.

MARSHALLIA GRAMINIFOLIA (Walt.) Small

MARSHALLIA GRAMINIFOLIA CYANANTHERA (Elliott)

MARSHALLIA GRAMINIFOLIA LACINARIOIDES (Small)

VOLUME I NUMBER 2

Biltmore Botanical Studies

A Journal of Botany

Embracing Papers by the Director and Associates

OF THE

BILTMORE HERBARIUM

CONTENTS:

NEW SPECIES OF THORNS FROM THE SOUTHEASTERN STATES, II . . *C. D. Beadle* . 51
STUDIES IN THE GENUS AMORPHA . . . . . *F. E. Boynton* . 138
TWO NEW SOUTHERN SPECIES OF COREOPSIS . . . . . *F. E. Boynton* . 141
NOTES FROM A COLLECTOR'S FIELD-BOOK . . . . . *C. L. Boynton* . 143
A SKETCH OF THE SAND MOUNTAIN FLORA . . . . . *T. G. Harbison* . 151
NEW OR LITTLE KNOWN SPECIES OF TRILLIUM, II . . . . . *T. G. Harbison* . 158
STUDIES IN PHILADELPHUS . . . . . *C. D. Beadle* . 159
TWO DRUPACEOUS TREES FROM ALABAMA . . . . . *C. D. Beadle* . 162

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NEW SPECIES OF THORNS FROM THE SOUTHEASTERN STATES. II

VIRIDES

Ripe fruit red, or at least with ruddy cheeks
- Leaves ovate-lanceolate, elliptic or obovate, either narrowed or contracted at the base
  - Leaves coarsely and irregularly serrate, often with blunt or acute shallow lobes
    - Leaves ample, 2–4^{cm} wide . . . . . *C. viridis* L.[1]
    - Leaves (exclusive of the shoots) 1–2^{cm} wide: twigs very spiny . . . . . *C. paludosa* Sarg.[2]
  - Leaves all sharply serrate and incisely lobed
    - Inflorescence pilose-pubescent: terminal leaves of the shoots broadly ovate with broad, rounded or truncate bases . . . . . *C. subviridis*
    - Inflorescence glabrous: terminal leaves of the shoots broadly ovate, mostly with broad, rounded bases . . . . . *C. interior*
- Leaves all broadly ovate or oval, rounded or very abruptly contracted at the base: fruit yellowish-green flushed with red, 7–9^{mm} in diameter . . . . . *C. vulsa* Beadle[3]

Ripe fruit bright canary-yellow . . . . . *C. brazoria* Sarg.[4]

Cratægus subviridis n. sp.

A tree 6–8^{m} tall with a short trunk sometimes 2^{dm} in diameter covered with gray, fissured bark, dividing 1–3^{m} above the ground into several ascending or spreading branches, forming an oval, usually compact, symmetrical head; or often a large much-branched shrub with one or more stems: leaves ovate, obovate or oval, the blades 2.5–6^{cm} long, 1–4^{cm} wide, or larger on leading shoots, acute or acuminate, rarely rounded at the apex, contracted or narrowed at the base, or on the shoots rounded or truncate; they are nearly glabrous on the upper surface at the time of unfolding, or with some conspicuous pubescence along the midrib and in the groove of the petioles, pale beneath and bearing large tufts of white hairs in the axils of the prominent ascending veins,

[1] Sp. Pl. 476, 1753.
[2] Ineditus.
[3] B. B. Studies **1**: 39, 1901.
[4] Bot. Gaz. **31**: 233, 1901.

Issued April 30, 1902.

at maturity firm in texture, glabrous or glabrate, the borders serrate and incisely lobed: petioles 1–2.5^{cm} long, margined: flowers 12–15^{mm} wide, expanding about the first of April and when the leaves are nearly grown; they are borne in compound many-flowered, pilose-pubescent corymbs, the lower branches of which are axillary: pedicels and hypanthium sparsely pilose: sepals 3–4^{mm} long, narrowly lanceolate, entire or minutely serrate, pubescent on the inner surface, at least at flowering time: stamens normally 20, 4–6^{mm} long: fruit globose, 5–7^{mm} in diameter: nutlets 3–5, about 5^{mm} long, the lateral surfaces nearly plane and the back either smooth or with shallow grooves: hypostyle three-fourths as long as the ventral angle.

Cratægus subviridis was found in low woods and bordering watercourses near Chattahoochee, Florida (type locality), in which region the species is not uncommon.

The type material, consisting of flowers (*B2076*) and fruit (*B2076*^{2}) from the same tree, is preserved in the Biltmore Herbarium.

Cratægus interior n. sp.

A small tree about 5^{m} tall with a trunk 1–2^{dm} in diameter, dividing 1–2^{m} from the base, the ascending branches forming an oval, symmetrical crown, or frequently a large, much-branched shrub: bark dark gray or brownish, flaky; of the branches smooth, the growth of the season glabrous, reddish-brown marked by small pale lenticels: spines stout, 1–3^{cm} long on the smaller branches, chestnut-brown or gray: leaves ovate, ovate-lanceolate or oblong, the blades 2–6^{cm} long, 1–4^{cm} wide, acute or acuminate at the apex, rounded or abruptly contracted at the base; they are pubescent on the upper surface along the midrib and largest veins and in the groove of the petiole at the time of unfolding, and on the lower surface bear tufts of pale hairs in the axils of the veins, becoming in age glabrous or glabrate, the borders serrate and deeply incised: petioles 5^{mm}–2.5^{cm} long, margined: flowers about 15^{mm} wide, appearing when the leaves are nearly grown and expanding during the last of April or first of May; they are borne in compound, many-flowered, glabrous corymbs, the lower branches of which arise from the axils of leaves: pedicels and hypanthium glabrous: sepals 2–3.5^{mm} long, entire or slightly ser-

rate: stamens normally 20, the anthers yellow: fruit globose, bright red at maturity, 7–8^{mm} in diameter: nutlets 3–5, about 5^{mm} long, the lateral surfaces nearly plane, and the back either smooth or slightly ridged: hypostyle occupying about two-thirds of the ventral angle.

Cratægus interior is abundantly represented in the flat woods near Chattanooga, Tennessee (type locality). The type material, flowers (*B4243*) and fruit (*B4243*$^{2\&3}$) from the same tree, is preserved in the Biltmore Herbarium.

SILVICOLÆ

Inflorescence and young shoots glabrous . . . . . *C. silvicola* Beadle[5]
Inflorescence and young shoots sparsely pubescent . . . . *C. æmula*

Cratægus æmula n. sp.

A shrub or small tree 3–5^{m} tall with a short, slender trunk covered with smooth or slightly fissured and scaly dark gray or brownish bark, the ascending or spreading branches forming an irregular crown: spines 3–5^{cm} long, chestnut-brown or gray, or frequently larger and compound: leaves broadly ovate, oval or suborbicular, the blades 3–5^{cm} long, 1.5–4^{cm} wide, acute at the apex, rounded or contracted at the base, the margins serrate and incised; they are sparsely pubescent on the upper surface at the time of unfolding, smoother beneath, but showing some short, scattered hairs along the midrib and principal veins, becoming in age glabrous or glabrate: petioles 5^{mm}–1.5^{cm} long, pubescent, at least when young, margined, glandular: flowers 14–18^{mm} wide, appearing when the leaves are about half grown, usually about the 20th of April; they are borne in subsimple, 5–10-flowered corymbs: pedicels and hypanthium sparsely pubescent: sepals lanceolate, about 4^{mm} long, glandular-serrate or pectinately-glandular: stamens normally 10, rarely 12, the anthers purple: fruit, which ripens and falls early in September, globose or subglobose, 10–13^{mm} in diameter, red at maturity, the flesh firm: nutlets 3–5, 5–7^{mm} long, the lateral surfaces plane and the back either smooth or shallowly grooved and ridged: hypostyle about two-thirds as long as the ventral angle.

Cratægus æmula is distributed throughout the extreme northwestern portion of the state of Georgia, especially at Rome (type locality), where the species

[5] Bot. Gaz. **28**: 414, 1899.

is common in the flat woods and valley of Horse-leg creek, extending westward across the state of Alabama to eastern Mississippi, and is likely to exist in portions of middle and eastern Tennessee. Evidently a connecting link between *C. silvicola* Beadle l.c. and the PUNCTATÆ. Often grows side by side with *C. collina* Chapm.[6] and the segregate immediately following, but, like *C. silvicola*, is much earlier to blossom.

The type specimens, consisting of flowers (*B4148*) and fruit (*B4148²*) from the same tree, are preserved in the Biltmore Herbarium.

PUNCTATÆ

Fruit large, at maturity more than 1^{cm} thick
- Anthers pink: fruit 18–25^{mm} wide . . . . . *C. punctata* Jacq.[7]
- Anthers yellow or almost white: fruit 11–15^{mm} wide
  - Petioles and leaf-bases glandless or nearly so . . . *C. collina* Chapm. l. c.
  - Petioles and leaf-bases conspicuously glandular . *C. rigens*

Fruit not exceeding 1^{cm} in diameter
- Inflorescence pubescent
  - Anthers white or light yellow: leaves sharply serrate and very incisely lobed . . . . . *C. amnicola*
  - Anthers pink or purple: leaves serrate and shallowly incised . . . . . *C. ingens*
- Inflorescence glabrous, or with a few weak hairs
  - Leaf-borders sharply serrate and shallowly incised . *C. penita*
  - Leaf-borders coarsely serrate and deeply incised . *C. margaretta* Ashe[8]

Cratægus rigens n. sp.

A small tree 4–6^{m} tall with a trunk sometimes 2^{dm} in diameter, clothed with dark gray, fissured and scaly bark, or more frequently a large, much-branched shrub with one or several stems: spines stout, 2.5–4^{cm} long, or often larger and compound, chestnut-brown or gray: leaves obovate, broadly oval or occasionally nearly round, the blades 2–5^{cm} long, 1.5–4^{cm} wide, mostly pointed at the apex, contracted or narrowed at the base into margined, glandular petioles 5^{mm}–2^{cm} long, the borders sharply and irregularly serrate and occasionally shallowly incised, especially on leading shoots; they are pubescent on both surfaces at the time of unfolding, and particularly on the lower surface along the midrib and the 3–5 pairs of ascending, straight veins, either glabrous or glabrate when fully grown, bright green on the upper surface, paler beneath, coriaceous or subcoriaceous in texture, fading in

6 Flora S. U. S. ed. 2, second suppl. 684, 1892.
7 Hort. Vind. **1**: 10, 1770.
8 Jour. E. Mitchell Soc. **16²**: 72, 1900.

autumn with tones of yellow, orange and brown: flowers 18–22^{mm} wide, appearing in April and when the leaves are about half grown; they are produced in simple or subsimple, 3–9-flowered corymbs: pedicels and hypanthium pubescent: sepals lanceolate, 4–6^{mm} long, pubescent, glandular: stamens normally 20, the anthers nearly white: fruit, which ripens and falls in August and early September, subglobose or slightly pyriform, 9–12^{mm} thick, red when fully ripe, the flesh firm: nutlets 3–5, about 8^{mm} long, the lateral surfaces nearly plane and the back usually ridged and grooved: hypostyle occupying two-thirds of the ventral angle.

Cratægus rigens inhabits woods and banks of streams throughout northwestern and central western Georgia to central eastern and northeastern Alabama.

The type material, collected at Gadsden, Alabama, and representing flowers (*B4206*) and fruit (*B4206*^{2}) from the same tree, is preserved in the Biltmore Herbarium.

Cratægus amnicola n. sp.

A tree occasionally 8^{m} tall with a trunk 2–3^{dm} in diameter, clothed with dark gray or reddish-brown, scaly bark: branches spreading or ascending, armed with stout, gray or chestnut-brown spines 3–5^{cm} long, forming a large spreading top: leaves obovate, oval or ovate, the blades 2–6^{cm} long, 1.5–4^{cm} wide, acute at the apex, contracted or narrowed at the base into margined, glandless or sparingly glandular petioles 5^{mm}–2^{cm} long, the margins sharply and irregularly serrate and incised; they are slightly pubescent at the time of unfolding on the upper surface, especially along the midrib and lower portions of the veins, paler and less pubescent on the lower surface, the hairs being confined to the midrib and veins, together with their axils, becoming firm or subcoriaceous in texture, bright green and glabrous at maturity, fading in autumn with tones of yellow, orange, red and brown: flowers about 15^{mm} wide, appearing when the leaves are more than half grown and usually during the last of April or first of May; they are borne in compound, many-flowered, pubescent corymbs, the lower branches of which are axillary: pedicels and hypanthium pubescent: sepals 4–5^{mm} long, glandular or pectinately-glandular: stamens 20, the anthers nearly white: fruit, which ripens in October, subglobose, 7–10^{mm} in diameter, red, the flesh firm: nutlets 3–5, about 6^{mm} long, the lateral surfaces nearly plane and the back either

smooth or shallowly grooved and ridged: hypostyle two-thirds the length of the ventral angle.

Cratægus amnicola is a very handsome, large thorn, and on account of its deep green, ample foliage, symmetrical outline and wealth of flowers and highly colored fruit, is destined to be a favorite in cultivation. The species is abundantly represented on river banks and in low woods in eastern Tennessee and adjacent stations in Georgia and Alabama.

The type material, collected at Chattanooga, Tennessee, and representing flowers (*B4239*) and fruit (*B4239*[2 & 3]) from the same tree, is preserved in the Biltmore Herbarium.

Cratægus ingens n. sp.

A tree 5–8^{m} tall with a trunk sometimes 3^{dm} in diameter, branching 2–3^{m} above ground and forming a large spreading top: bark of the main axis dark gray or brownish, fissured and broken on the surface into numerous plate-like scales; of the branches smooth, grayish-brown, the growth of the season at first pubescent, becoming glabrous and marked by numerous small pale lenticels: leaves obovate, oval or ovate, the blades 2.5–7^{cm} long, 1.5–5^{cm} broad, mostly pointed at the apex, contracted at the base into winged petioles 1–2^{cm} long, the borders serrate or crenate-serrate and shallowly lobed and incised; they are slightly pubescent at the time of unfolding, especially on the upper surface and on the midrib and veins beneath, becoming smooth in age or with some persistent pubescence on the lower surface, firm to subcoriaceous in texture, dark green, fading in autumn with tones of yellow, orange, red and brown: flowers 10–13^{mm} wide, appearing the latter part of April or first of May and when the leaves are more than half grown; they are produced in compound, many-flowered, pubescent corymbs, the lower branches of which arise from the axils of leaves: pedicels and hypanthium pubescent: sepals linear-lanceolate, 4–6^{mm} long, glandular: stamens normally 20, the anthers bright purple: fruit, which ripens in October, globose or subglobose, 7–9^{mm} wide, red when fully ripe, the flesh firm: nutlets 3–5, about 6^{mm} long, the lateral surfaces nearly plane and the back either smooth or shallowly grooved and ridged: hypostyle three-fourths as long as the ventral angle.

Cratægus ingens frequently develops into a very stocky, spreading tree of

remarkable proportions. The species is not uncommon in moist woods and on banks of streams in southeastern Tennessee and northwestern Georgia.

The type material, which is preserved in the Biltmore Herbarium, was found at Chattanooga, Tennessee, and represents both flowers (*B4234*) and fruit (*B4234*^{2}) from the same tree.

Cratægus penita n. sp.

A tree 4–6^m tall with a short trunk sometimes 2.5^{dm} in diameter, clothed with brownish-gray bark, the stout, ascending or spreading branches forming a wide-spreading crown: young twigs sparsely pubescent, becoming glabrous, marked with pale lenticels: leaves broadly obovate, oval or ovate, 2.5–6^{cm} long, 2–5^{cm} wide, acute at the apex, contracted or rounded at the base, the borders serrate and shallowly incised; they are but slightly pubescent when young, showing only some fine, soft, white hairs on the upper surface, especially along the midrib, trough of the petiole and lower portions of the veins and in their axils beneath, becoming glabrous in age, firm to subcoriaceous in texture, deep green, fading with tones of yellow, orange and brown: petioles 5^{mm}–2^{cm} long, slightly pubescent, at least when young, margined: flowers 15–18^{mm} wide, appearing during the latter part of April or first of May and when the leaves are almost fully grown; they are produced in compound, usually many-flowered glabrous or glabrate corymbs: pedicels and hypanthium glabrous or bearing a few weak hairs: sepals triangular-lanceolate, 3–5^{mm} long, glandular-serrate or entire, reflexed after anthesis: stamens about 20, the anthers faintly pink or almost white: fruit, which ripens in October, globose or depressed-globose, 8–10^{mm} wide, red at maturity, the flesh firm: nutlets 3–5, about 6^{mm} long, the lateral surfaces nearly plane and the back either smooth or slightly ridged and grooved, the hypostyle occupying two-thirds of the ventral angle.

Cratægus penita is abundantly represented in southeastern Tennessee, growing in low woods and on the banks of streams, and is most likely to occur in similar situations in adjacent Georgia and Alabama.

The type material, collected at Chattanooga, Tennessee, and representing flowers (*B4233*) and fruit (*B4233*^{2}) from the same tree, is preserved in the Biltmore Herbarium. At this station are numerous examples of this thorn, the largest of them with the aspect of well developed apple trees. The broad, bright but deep green leaves, symmetrical, spreading crown and size of trunk, present characters that commend this species to planters and horticulturists.

BOYNTONIANÆ

Pomes globose, or nearly so
- Anthers yellow: sepals without stalked glands . . . *C. boyntoni* Beadle[9]
- Anthers purplish: sepals with stalked glands
  - Large shrub or small tree: nutlets 7.5–9mm long . *C. buckleyi* Beadle[10]
  - Low shrub: nutlets smaller . . . . . *C. communis*

Pomes pyriform
- Fruit yellow or greenish yellow . . . . . *C. straminea* Beadle[11]
- Fruit red . . . . . *C. rubella* Beadle[12]

Cratægus communis n. sp.

A shrub 1–2m tall, frequently growing in clumps or patches of considerable area. Branches armed with chestnut-brown or gray spines 1.5–4cm long, the bark gray, tinged with brown, or the growth of the season reddish-brown, marked with small pale lenticels: leaves ovate, oval or broadly oval, 2–5.5cm long, exclusive of the petiole, 1.5–4cm wide, acutely or bluntly pointed at the apex, rounded or contracted at the base and prolonged into margined, glandular petioles 5mm–2cm long, the borders serrate and incised, usually bearing at the base a few stalked glands; they are glabrous at maturity, but at the time of unfolding display some slight pubescence on the upper surface, especially along the midrib and bases of the largest veins, thin to firm in texture, yellowish-green, fading with tones of yellow, orange and brown: flowers 15–20mm wide, expanding early in May and when the leaves are almost or quite developed; they are borne in simple, 2–5-flowered corymbs which terminate short, leafy branchlets of the present season's growth: pedicels and hypanthium glabrous: sepals triangular lanceolate, 4–6mm long, serrate and glandular: stamens 10, the anthers pale purple or nearly white: fruit, which ripens in late September, globose or subglobose, 9–13mm in diameter, red when ripe, the flesh firm: nutlets 3–5, 6–7mm long, the lateral surfaces nearly plane and the back grooved and ridged: hypostyle about 3mm long.

Cratægus communis grows on the limestone formation of the Cumberland Mountains, near Cowan (type locality), Franklin county, Tennessee.

The original specimens (*H1263* and *H4401*) are preserved in the Biltmore Herbarium.

[9] Bot. Gaz. **28**: 409, 1899.
[10] B. B. Studies **1**: 25, 1901.
[11] Bot. Gaz. **30**: 345, 1900.
[12] Bot. Gaz. **30**: 344, 1900.

SARGENTIANÆ

Mature fruit yellow, orange-yellow or green, sometimes cheeked with red
  Ripe pomes often 1cm or more in diameter
    Leaves acuminate: sepals long and broad . . . . *C. sargenti* Beadle[13]
    Leaves acute: sepals short and narrow
      Fruit subglobose or oval . . . . . *C. pallens* Beadle[14]
      Fruit globose . . . . . *C. austrina*
  Ripe pomes smaller
    Anthers pale purple: leaf-blades elongated . . . *C. gilva*
    Anthers dark purple: leaf-blades not conspicuously elongated . . . . . *C. contrita*
Mature fruit red or ruddy
  Ripe pomes oval or pyriform
    Fruit 1cm or more thick . . . . . *C. venusta* Beadle[15]
    Fruit smaller . . . . . *C. inanis.*
  Ripe pomes globose or nearly so
    Leaves incised or incisely lobed
      Flowers 20–25mm wide, anthers yellow: leaves acuminate . . . . . *C. eximia*
      Flowers smaller: anthers purplish
        Fruit 10–13mm in diameter
          Fruit depressed: leaves shallowly incised . . . . . *C. tecta* Beadle[16]
          Fruit not depressed
            Leaves deeply incised . . . . . *C. ancisa*
            Leaves shallowy incised . . . . . *C. alma*
        Fruit smaller
          Anthers pale purple: fruiting pedicels 1–2cm long . . . . . *C. pinetorum* Beadle[17]
          Anthers dark purple: fruiting pedicels very short . . . . . *C. macilenta*
    Leaves slightly if at all incised . . . . . *C. mendosa*

Cratægus austrina n. sp.

A small tree 4–6m tall with a short trunk 1–2dm in diameter, covered with dark gray or brownish scaly bark, or oftener a large, much-branched shrub with one or more stems: spines stout, 2–4cm long, chestnut-brown or gray: leaves ovate, oval or oblong-oval, 2–5cm long exclusive of the petioles, 1–4cm wide, or even

[13] Bot. Gaz. **28**: 407, 1899.
[14] B. B. Studies **1**: 27, 1901.
[15] Bot. Gaz. **30**: 338, 1900.
[16] B. B. Studies **1**: 26, 1901.
[17] Bot. Gaz. **30**: 343, 1900.

larger on leading shoots, pointed at the apex, rounded or contracted at the base, or on vigorous shoots sometimes truncate, the borders serrate and incised; they are glabrous, or when young display a few weak hairs on the upper surface of the midrib and bases of the largest veins, firm to subcoriaceous in texture, green or yellow-green, fading with tones of yellow, orange and brown: petioles margined, 5–15^{mm} long, glandular: flowers 15–18^{mm} wide, produced in simple, 5–8-flowered corymbs and expanding early in April and when the leaves are about half grown: pedicels and hypanthium glabrous: sepals 3–4^{mm} long, glandular-serrate, reflexed after anthesis: stamens normally 20, the anthers small, bright purple: fruit, which ripens and falls in October, globose, about 1^{cm} in diameter, green or greenish-yellow at maturity, the flesh firm: nutlets 3–5, about 7^{mm} long, the lateral surfaces plane and the back ridged and grooved: hypostyle 4^{mm} long.

Cratægus austrina is abundantly represented in the region about Greenville, Alabama (type locality), growing on wooded slopes in clay soil.

The type specimens, representing flowers (*B2151*) and fruit (*B2151*^{2}) from the same tree, are preserved in the Biltmore Herbarium.

Cratægus gilva n. sp.

A shrub 1–5^{m} tall with dark gray scaly bark and spreading branches which are sometimes armed with chestnut-brown or gray spines 2–4^{cm} long: leaves elliptic, ovate or ovate-lanceolate, 3–7^{cm} long exclusive of the petioles, 1.5–5^{cm} wide, acute or acuminate at the apex, narrowed or contracted at the base, the borders serrate and incised; they are glabrous when fully grown, but when unfolding bear a few weak hairs on the upper side along the midrib, thin to firm in texture, dark green, fading with tones of yellow, orange, red and brown: petioles 1–2.5^{cm} long, margined, often glandular: flowers 15–20^{mm} wide, expanding early in May and when the leaves are almost fully grown; they are disposed in simple, glandular-bracteate, 3–7-flowered corymbs: pedicels and hypanthium glabrous: sepals about 4^{mm} long, glandular-serrate, reflexed after anthesis: stamens 20, the anthers pale purple: fruit, which ripens and falls in September and October, subglobose or short-pyriform, 6–8^{mm} wide, at maturity yellow or greenish-yellow, rarely with a flushed cheek, the flesh firm: nut-

lets 3–5, about 5^{mm} long, the lateral surfaces plane: hypostyle about 2^{mm} long.

Cratægus gilva inhabits the rocky woods, banks and glades of Marshall county, Alabama, and is common a few miles from Albertville, where the original specimens were collected.

The type, representing flowers (*H4374*) and fruit (*H4374*^{2}) from the same shrub, is preserved in the Biltmore Herbarium.

Cratægus contrita n. sp.

A tree sometimes 6–7^{m} tall with a trunk sometimes 1–2^{dm} in diameter, covered with ashy gray or brownish scaly bark, or more frequently a large shrub with spreading branches: spines stout, 1–2.5^{cm} long, chestnut-brown or gray: leaves ovate, oval or oblong, rarely short-obovate or suborbicular, the blades 2–5^{cm} long, 1.5–5^{cm} wide, acute or bluntly terminated at the apex, rounded or contracted at the base, the borders serrate and incised; they are glabrous at maturity, but at the time of unfolding bear a few white hairs along the midrib and lower portions of the largest veins on the upper surface, firm in texture, green or yellow-green, fading with tones of yellow, orange and brown: petioles 5^{mm}–2^{cm} long, margined: flowers 12–17^{mm} wide, opening during the last of March or early in April and when the leaves are about half grown; they are produced in simple glandular-bracteate, 3–7-flowered corymbs and terminate short, leafy shoots of the present season's growth: pedicels and hypanthium glabrous: sepals 3–5^{mm} long, glandular-serrate, reflexed after anthesis: stamens 20, the anthers dark purple: fruit, which ripens and falls in September and October, subglobose, 7–9^{mm} in diameter, yellow-green or orange at maturity, often with ruddy cheeks, the flesh firm: nutlets 2–3, rarely 3–5, about 6^{mm} long, the lateral surfaces nearly plane and the back grooved and ridged: hypostyle occupying a trifle more than half of the ventral angle.

Cratægus contrita is common in dry woods and uplands near River Junction, Florida (type locality), and is also represented from stations in southwestern Georgia.

The type material, representing flowers (*B2078*) and fruit (*B2078*^{2}), is preserved in the Biltmore Herbarium.

Cratægus inanis n. sp.

A shrub 2–4^{m} tall with dark gray or brownish-black, smooth or scaly bark: branches, which are armed with chestnut-brown or gray spines, spreading or ascending, the bark gray or reddish-brown, that of the young shoots marked by small pale lenticels: leaves ovate, broadly ovate or oval, sometimes suborbicular in outline, 2–5^{cm} long exclusive of the petioles, 1.5–5^{cm} wide, acute or short-pointed at the apex, rounded or abruptly contracted at the base, the borders serrate and incised; they are glabrous at maturity, but at the time of unfolding bear a few weak hairs on the upper side of the midrib, thin to firm in texture, bright green, fading in autumn with tones of red, yellow and brown: petioles 1–2^{cm} long, winged: flowers 14–18^{mm} in diameter, expanding early in May and when the leaves are nearly grown; they are produced in 3–6-flowered corymbs which terminate short, leafy branchlets: pedicels and hypanthium glabrous: sepals 3–4^{mm} long, serrate and glandular near the apex, reflexed after anthesis: stamens normally 20, the anthers yellow: fruit, which ripens and falls in October, short-oval or slightly pyriform, 6–8^{mm} wide, red or ruddy at maturity, the flesh firm: nutlets 3–5, about 6^{mm} long, the lateral surfaces nearly plane and the back ridged and grooved: hypostyle occupying about half of the ventral angle.

Cratægus inanis frequents the rocky woods and glades of Marshall county, Alabama, where, a few miles from Albertville (type locality), the species is not uncommon.

The type material, representing flowers (*H4306*) and fruit (*H4306*^{2}) from the same plant, is preserved in the Biltmore Herbarium.

Cratægus eximia n. sp.

A shrub 2–4^{m} tall with dark gray scaly bark and spreading branches which are armed with stout, chestnut-brown or gray spines 3–7^{cm} long: leaves ovate and ovate-lanceolate, the blades 3–8^{cm} long, 2–6^{cm} wide, acute or acuminate at the apex, rounded or contracted, or on leading shoots sometimes truncate at the base, the borders serrate and incised; they are glabrous soon after the time of unfolding, firm in texture, bright green, fading in autumn with tones of yellow, orange, red and brown: flowers 2–2.5^{cm} broad, opening from the middle to the last of May and

when the leaves are fully grown; they are produced in simple, glandular-bracteate, 3–6-flowered corymbs which terminate short, leafy branchlets: pedicels 1–2^{cm} long, glabrous, as is the hypanthium: sepals 5–6^{mm} long, glandular serrate, reflexed after anthesis: stamens 20, the anthers yellow: fruit, which ripens in October, globose, 8–12^{mm} wide, red at maturity, the flesh firm: nutlets 3–5, 6–7^{mm} long, the lateral surfaces plane: hypostyle about 3^{mm} long.

Cratægus eximia is a most beautiful thorn, especially noteworthy on account of the large foliage and flowers and its bright red fruit. Common in rocky glades on Sand Mountain, near Pisgah, Jackson County, Alabama (type locality).

The original specimens, flowers (*H4448*) and fruit (*H5248*) from the same shrub, are preserved in the Biltmore Herbarium.

Cratægus ancisa n. sp.

A small tree 4–5^{m} tall with a short trunk sometimes 1–1.5^{dm} in diameter, clothed with dark gray scaly bark, but more frequently a much-branched shrub with ascending or spreading branches which are sometimes armed with spines 3–5^{cm} long: leaves ovate or oval, 2.5–6^{cm} long exclusive of the petioles, 1.5–5^{cm} wide, acute at the apex, contracted or rounded, or on leading shoots truncate at the base, the borders serrate and deeply incised; they are glabrous at the time of unfolding, except for a few weak, deciduous hairs along the midrib and largest veins on the upper surface, firm to subcoriaceous in texture, fading in autumn with tones of yellow, brown and orange: petioles 1–3^{cm} long, margined, remotely glandular: flowers 15–20^{mm} wide, expanding during the latter part of April and when the leaves are about half grown; they are disposed in simple, glandular-bracteate, 3–6-flowered corymbs which terminate short leafy branchlets of the present season's growth: pedicels and hypanthium glabrous: sepals 3–4^{mm} long, glandular-serrate, reflexed after anthesis: stamens 20, the anthers pale purple: fruit, which ripens in October, globose or subglobose, 10–12^{mm} in diameter, at maturity red or ruddy, the flesh firm: nutlets 3–5, 6–7^{mm} long, the lateral surfaces nearly plane: hypostyle occupying about two-thirds of the ventral angle.

Cratægus ancisa frequents hillsides and upland woods and is distributed from Meridian, Mississippi (type locality), to central and eastern Alabama.

The type material (*H5092*) is preserved in the Biltmore Herbarium.

Cratægus alma n. sp.

A shrub 2–4^{m} tall with dark gray, either smooth or scaly bark and spreading or ascending branches which are sometimes armed with spines 2–3^{cm} long: leaves ovate, oval or obovate, the blades 2–6^{cm} long, 1.5–4^{cm} wide, pointed at the apex, either rounded, contracted or narrowed at the base, the borders serrate and incised; they are glabrous, firm in texture, bright green, fading in autumn with tones of yellow, brown and orange: petioles 1–2^{cm} long, margined: flowers 15–20^{mm} wide, opening from the middle to the last of April; they are produced in glabrous, glandular-bracteate, 3–7-flowered corymbs which terminate short, leafy branchlets: pedicels and hypanthium glabrous: sepals glandular-serrate or subentire, about 4^{mm} long, reflexed after anthesis: fruit, which ripens in October, subglobose, 10–12^{mm} in diameter, red when fully ripe, the flesh firm: nutlets 3–5, 7–8^{mm} long, the lateral surfaces plane: hypostyle about half the length of the nutlet.

Cratægus alma was discovered on the gravelly hills near Meridian, Mississippi (type locality), and is abundantly represented in that region.

The type material (*H5147*) is preserved in the Biltmore Herbarium.

Cratægus macilenta n. sp.

A shrub 3–5^{m} tall with dark gray, either smooth or scaly bark and ascending or spreading branches which are sometimes armed with spines 2–4^{cm} long: leaves ovate, oval or obovate, the blades 2–6^{cm} long, 2–5^{cm} wide, acute at the apex, rounded or contracted at the base, the borders serrate and incised; they are glabrous, at least when fully grown, thin to firm in texture, bright green, fading in autumn with tones of yellow, red and brown: petioles 1–2.5^{cm} long, margined, usually bearing a few small glands: flowers 15–18^{mm} wide, opening early in May and when the leaves are almost fully grown; they are disposed in simple, 3–7-flowered corymbs which terminate short, leafy branchlets: pedicels 5^{mm}–1^{cm} long, glabrous, as is the hypanthium: sepals about 4^{mm} long, glandular-serrate, reflexed after anthesis: stamens 20, the anthers dark purple: fruit, which ripens and falls in September and October, globose or subglobose, 7–9^{mm} in diameter, red when fully ripe, the flesh firm: nutlets 3–5, 5–6^{mm} long: the lateral sur-

faces nearly plane: hypostyle a little less than half the length of the ventral angle.

Cratægus macilenta grows in rocky woods and glades near Albertville, Marshall county, Alabama (type locality).

The type specimens, consisting of flowers (*H4283*) and fruit (*H5203*) from the same shrub, are preserved in the Biltmore Herbarium.

Cratægus mendosa n. sp.

A shrub or small tree 3–6^{m} tall with a short trunk sometimes 1–1.5^{dm} in diameter covered with dark gray scaly bark, the branches spreading or ascending, sometimes armed with chestnut-brown or gray spines 2–5^{cm} long: leaves oval, ovate or elliptic, occasionally ovate-lanceolate or slightly oblanceolate, the blades 3–6^{cm} long, 1.5–4.5^{cm} wide, bluntly pointed or even rounded at the apex, rounded or contracted at the base, the borders serrate, rarely very shallowly and bluntly incised; they are glabrous, or at the time of unfolding bear a few weak caducous hairs along the midrib on the upper surface, firm to subcoriaceous in texture, bright green, fading in autumn with tones of yellow, red and brown: petioles 1–3.5^{cm} long, winged, remotely glandular: flowers 15–18^{mm} wide, expanding early in May and when the leaves are almost fully grown; they are produced in simple, 3–6-flowered corymbs which terminate short leafy branchlets of the present season's growth: pedicels 1^{cm} or less long, glabrous, as is the hypanthium: sepals 3–4^{mm} long, glandular-serrate, reflexed after anthesis: stamens about 20, the anthers very faintly tinged with purple: fruit, which ripens and falls in October, globose or subglobose, 8–10^{mm} in diameter, red at maturity, the flesh firm: nutlets 3–5, 5–6^{mm} long, 3–4^{mm} measured dorso-ventrally, the lateral surfaces nearly plane: hypostyle about 3^{mm} long.

Cratægus mendosa has been found in rocky woods and glades in Marshall county, Alabama, where, near Albertville (type locality), it is abundant. Specimens of this most distinct species were first collected in July, 1899, but ripe and perfect fruiting specimens were not available until the autumn of 1901, owing mainly to the attacks of a species of fungus which affected the ripening of the pomes.

The type material, consisting of flowers (*H4336*) and fruit (*H5219*) from the same tree, is deposited in the Biltmore Herbarium.

PULCHERRIMÆ

Fruit oval at maturity, the flesh attenuate with the pedicel
  Anthers dark: leaf-blade elongated
    Fruit 6–8mm long . . . . . *C. pulcherrima* Ashe[18]
    Fruit 10–12mm long . . . . . *C. abstrusa*
  Anthers light: leaf-blade short . . . . . *C. lenis*
Fruit globose or nearly so, the flesh not attenuate with the pedicel
  Leaves more than 2cm wide
    Leaf-blades conspicuously elongated, 5–8cm long . . *C. incilis* Beadle[19]
    Leaf-blades shorter
      Pomes depressed-globose: leaves 3–5cm broad . *C. illustris*
      Pomes not depressed: leaves narrower
        Anthers dark purple . . . . . *C. optima* Beadle[20]
        Anthers pale purple
          Leaf-borders with round, usually sharp-pointed lobes . . . . . *C. assimilis*
          Leaf-borders with acute lobes . . . . . *C. robur*
  Leaves (exclusive of the shoots) mostly less than 2cm wide . . . . . *C. concinna*

Cratægus abstrusa n. sp.

A shrub or small tree 2–5m tall with a slender trunk clothed with gray or brownish scaly bark, the spreading or ascending branches sometimes armed with chestnut-brown or gray spines 1–3cm long: leaves oval, ovate, obovate or orbicular, the blades 2–4.5cm long, 1.5–3.5cm broad, obtuse or slightly pointed at the apex, contracted at the base, the borders serrate and with shallow, rounded, lobe-like incisions; they are glabrous, or when young bear a few pale, deciduous hairs along the midrib and lower portions of the largest veins on the upper surface, firm to subcoriaceous in texture, bright green, fading in autumn with tones of yellow, orange and brown: petioles 5mm–2cm long, margined, remotely glandular: flowers 15–20mm wide, opening the last of March or early in April and when the leaves are more than half grown; they are disposed in glandular-bracteate, simple, 3–7-flowered corymbs which terminate short, leafy branchlets of the present season's growth: pedicels 5–12mm long, glabrous, as is the hypanthium: sepals triangular-lanceolate, 3–4mm long,

[18] Journ. E. Mitchell Soc. **16**[2]: 77, 1900.
[19] B. B. Studies **1**: 41, 1901.
[20] B. B. Studies **1**: 40, 1901.

serrate or entire, reflexed after anthesis: stamens 20, the anthers dark purple: fruit, which ripens and falls in September and October, oval or short-pyriform, 7–9^{mm} thick, 10–12^{mm} long, the flesh firm: nutlets usually 2–3, rarely more, about 6^{mm} long, the lateral surfaces nearly plane: hypostyle occupying about half of the ventral angle.

Cratægus abstrusa grows in woods, mostly in sandy soil, near Tallahassee, Florida (type locality).

The original specimens, representing flowers (*H4059*) and fruit (*H4958*) from the same individual, are preserved in the Biltmore Herbarium.

Cratægus lenis n. sp.

A shrub or small tree 2–6^{m} tall with a short trunk sometimes 1–1.5^{dm} in diameter clothed with dark gray or brownish scaly bark, or frequently with several stems from the base, the spreading and ascending branches forming an oval or irregular, open crown: leaves ovate, oval or suborbicular, the blades 1.5–5^{cm} long, 1.5–5^{cm} wide, mostly pointed at the apex, rounded or contracted or on leading shoots truncate or subcordate at the base, the borders serrate and incisely lobed; they are glabrous, or when young with a few, weak, caducous hairs along the midrib and lower portions of the veins on the upper surface, thin to firm in texture, bright green, fading in autumn with tones of yellow and brown: petioles 7^{mm}–2^{cm} long, margined, remotely glandular: flowers 15–18^{mm} wide, expanding about the middle of April and when the leaves are more than half grown; they are produced in simple, glandular-bracteate, 3–7-flowered corymbs which terminate short, leafy branchlets: pedicels and hypanthium glabrous: sepals triangular-lanceolate, serrate or nearly entire, reflexed after anthesis: stamens 20, the anthers nearly yellow: fruit, which ripens in October, oval or sub-pyriform, 6–8^{mm} thick, 8–11^{mm} long, at maturity red or ruddy, the flesh firm: nutlets 2–3, rarely more, 5–6^{mm} long, the lateral surfaces nearly plane: hypostyle about half the length of the nutlet.

Cratægus lenis grows on wooded slopes, mostly in clay soil, near Greenville, Alabama (type locality).

The type specimens, which represent flowers (*B2153*) and fruit (*B2153*^{2}) from the same tree, are preserved in the Biltmore Herbarium.

Cratægus illustris n. sp.

A small tree or large shrub 3–6^{m} tall with a short trunk sometimes 1–1.5^{dm} in diameter clothed with scaly, rough bark of a dark gray or brownish color, the ascending or spreading branches forming a symmetrical open crown: leaves broadly ovate or oval, 3–5^{cm} long exclusive of the petioles, 2.5–5^{cm} wide, acute or obtusely pointed at the apex, rounded at the base, the borders serrate and mostly with rounded, lobe-like incisions; they are glabrous, firm to subcoriaceous in texture, bright green, fading in autumn with tones of yellow, orange and brown: petioles 1–2.5^{cm} long, margined: flowers 14–18^{mm} wide, expanding the latter part of April and when the leaves are two-thirds grown; they are produced in simple, 3–6-flowered corymbs which terminate short leafy branchlets: pedicels glabrous, 7–13^{mm} long: hypanthium glabrous: sepals triangular-lanceolate, about 3^{mm} long, serrate or nearly entire, reflexed after anthesis: stamens 15–20, the anthers dark purple: fruit, which ripens in October, depressed-globose, about 1^{cm} in diameter, the flesh firm: nutlets 3–5, 6–7^{mm} long, the lateral surfaces nearly plane: hypostyle about half the length of the nutlet.

Cratægus illustris is a remarkable species both on account of its ample, very broad leaves and its peculiar, depressed fruit.

The original specimens (*H4200* and *H4200*^{2}), which are deposited in the Biltmore Herbarium, are from a tree found growing on a gravelly hill near Meridian, Mississippi.

Cratægus assimilis n. sp.

A small tree or large shrub 3–6^{m} tall sometimes with a trunk 1–1.5^{dm} in diameter covered with dark gray or brownish scaly bark, the ascending or spreading branches occasionally armed with stout spines 1–2.5^{cm} long: leaves ovate or oval, the blades 2–5^{cm} long, 1.5–4^{cm} wide, acute at the apex, contracted or rounded at the base, the borders serrate and with rounded, lobe-like incisions; they are glabrous, or at the time of unfolding bear a few weak hairs along the midrib on the upper surface, firm in texture, deep green, fading in autumn with tones of yellow, orange and brown: petioles 7^{mm}–2^{cm} long, margined: flowers 15–18^{mm} wide, opening early in April and when the leaves are about two-

thirds grown; they are produced in simple, 3–6-flowered corymbs which terminate short, leafy branchlets: pedicels and hypanthium glabrous: sepals triangular-lanceolate, 3–4^{mm} long, serrate or nearly entire, reflexed after anthesis: stamens normally 20, the anthers pale purple: fruit, which ripens in September and October, globose, 7–9^{mm} wide, the flesh firm: nutlets 3–5, about 6^{mm} long, the lateral surfaces nearly plane: hypostyle occupying a trifle more than half the ventral angle.

Cratægus assimilis frequents the hills and dry woods near Chattahoochee, Florida (type locality), and has been found in similar situations lower down the Apalachicola river.

The type specimens, consisting of flowers (*H4096*) and fruit (*H4962*) from the same tree, are preserved in the Biltmore Herbarium,

Cratægus robur n. sp.

A tree sometimes 7–8^{m} tall with a trunk 1–1.5^{dm} in diameter clothed with gray or brownish scaly bark, or more often a large, much-branched shrub with one or more stems, the ascending or spreading branches sometimes armed with stout spines 2–3^{cm} long: leaves ovate, oval or short-obovate, the blades 3–6^{cm} long, 1.5–4^{cm} wide, or even broader on leading shoots, acute at the apex, narrowed or contracted, or on vigorous shoots rounded or subtruncate at the base, the borders serrate and incisely lobed or acutely cleft; they are glabrous, thin to firm in texture, bright green, fading in autumn with tones of yellow, brown and orange: petioles 7^{mm}–2.5^{cm} long, margined: flowers 15–18^{mm} wide, opening the last of March or early in April and when the leaves are about two-thirds grown; they are borne in simple or subsimple, 3–10-flowered, glandular-bracteate, glabrous corymbs: pedicels and hypanthium glabrous, the former 1–2^{cm} long: sepals lanceolate, 3–4^{mm} long, entire or sparingly serrate, reflexed after anthesis: stamens normally 20, the anthers pale purple: fruit, which ripens in September and October, subglobose, 7–9^{mm} wide, the flesh firm: nutlets 3–5, 5–6^{mm} long, the lateral surfaces nearly plane: hypostyle about 4^{mm} long.

Cratægus robur has been found abundantly distributed in the woods and borders of fields near Tallahassee, Florida (type locality), and in similar situations in the same general region.

The type material, flowers (*B2051*) and fruit (*B2051*^{2}) from the same tree, is deposited in the Biltmore Herbarium.

Cratægus concinna n. sp.

A shrub 2–4^{m} tall, the main axis clothed with dark gray scaly bark: branches long, horizontal or ascending, sometimes armed with stout spines 1–3^{cm} long: leaves ovate-lanceolate, oblong or elliptic, those of the shoots ovate, 2–5^{cm} long exclusive of the petioles, 7^{mm}–2^{cm} wide, or on the shoots 3–4^{cm} wide, acute or bluntly pointed at the apex, narrowed or contracted or on leading shoots rounded at the base, the borders serrate and more or less incised, the lobes or incisions rounded, or on the largest leaves, acutely notched; they are glabrous, or at the time of unfolding bear a few weak hairs near the base of the midrib on the upper surface, firm to subcoriaceous in texture, green or yellow-green, fading with tones of yellow, brown and red: petioles 5^{mm}–2^{cm} long, margined: flowers 15–18^{mm} wide, expanding the last of March or early in April and when the leaves are about half grown; they are produced in simple, glandular-bracteate, 3–6-flowered corymbs which terminate short, leafy branchlets: pedicels and hypanthium glabrous: sepals triangular-lanceolate, mostly serrate, 3–4^{mm} long, reflexed after anthesis: stamens normally 20, the anthers purple: fruit, which matures in September and October, subglobose, 7–8^{mm} thick, the flesh firm: nutlets 3–5, about 5^{mm} long, the lateral surfaces nearly plane: hypostyle about half the length of the ventral angle.

Cratægus concinna was found in woods and on the margins of swamps in western Florida, especially near Bristol (type locality) and Mariana.

The type specimens, flowers (*H4040*) and fruit (*4911*) from the same shrub, are preserved in the Biltmore Herbarium.

FLAVÆ

Stamens 10 EUFLAVÆ

Fruit pyriform or globular-pyriform

Leaves dentate or crenate-dentate . . . . . *C. flava* Aiton[21]

Leaves very sharply serrate and incisely lobed. *C. alleghaniensis* Beadle[22]

Fruit globose

Leaves serrate: anthers purple . . . . . *C. frugiferens* Beadle[23]

Leaves dentate or crenate-dentate: anthers yellow . . . . . *C. aprica* Beadle[24]

21 Hort. Kew. **2**: 169, 1789.
22 Bot. Gaz. **30**: 337, 1900.
23 B. B. Studies **1**: 30, 1901.
24 Bot. Gaz. **30**: 335, 1900.

Stamens more numerous

Flowers produced in few, mostly 5–7-flowered corymbs: pedicels and hypanthium pubescent or glabrous (densely white-tomentose in one species of the Visendæ): leaves serrate, dentate or crenate, either pubescent or glabrous: branches spreading or ascendding, or occasionally drooping, as in the Visendæ

Leaves sharply serrate and pointed IGNAVÆ

Leaves serrate or coarsely and irregularlv dentate SORORIÆ

Leaves crenate SEGNES . . . . . *C. segnis* Beadle[25]

Leaves finely dentate or glandular-dentate, usually with several tooth-like lobes VISENDÆ

Flowers produced in few, mostly 3–5-flowered corymbs: pedicels and hypanthium tomentcse or pubescent (glabrous or nearly so in the Attritæ): leaves dentate, crenate or entire (occasionally serrate, as in the Sentæ), either tomentose, pubescent or glabrous: branches drooping

Fruits globose, subglobose or oval at maturity

Ripe pomes averaging 1^{cm} or more in diameter

Leaf borders glandular, either entire, dentate or crenate, often with blunt or sharp tooth-like lobes

Inflorescence tomentose or pubescent

Mature leaves densely tomentose on the lower surface MICHAUXIANÆ

Mature leaves less tomentose, sometimes merely pubescent or glabrous

Leaf-borders entire or nearly so INTEGRÆ

Leaf-borders toothed and often lobed DENTATÆ

Inflorescence glabrous or with a few weak hairs ATTRITÆ

Leaves serrate or serrate-dentate and incisely lobed SENTÆ

Ripe pomes averaging less than 1^{cm} in diameter ANISOPHYLLÆ

Fruit pyriform at maturity

Pomes large, 1.5–2^{cm} long and over 1^{cm} thick, COLONICÆ

Pomes smaller RECURVÆ

Flowers solitary or in twos and threes (more numerous in one species): pedicels and hypanthium glabrous or pubescent: leaves small, cuneate or spatulate, or sometimes with abruptly contracted bases: spines usually numerous LEPIDÆ

IGNAVÆ

Inflorescence glabrous or with a few weak hairs

Fruit subglobose or oval

Spines 2–3.5^{cm} long: anthers purple . . . . . *C. ignava* Beadle[26]

Spines 3.5–5^{cm} long: anthers yellow . . . . . *C. impar*

Fruit pyriform . . . . . *C. agrestina*

Inflorescence decidedly pubescent . . . . . *C. extraria*

[25] B. B. Studies I: 32, 1901.

[26] B. B. Studies I: 31, 1901.

Cratægus impar n. sp.

A large shrub 2–4^{m} tall with many stems and spreading or ascending branches, the largest of which are clothed with dark gray or brownish, rough or scaly bark: spines stout, chestnut-brown or gray, 2–5^{cm} long: leaves obovate or oval, or on leading shoots, broadly ovate, the blades 2–5^{cm} long, 1.5–4^{cm} wide, acute at the apex, narrowed or contracted, or on the shoots sometimes rounded at the base, the borders sharply serrate and incised; they are glabrous, or at the time of unfolding bear a few weak hairs on the base of the midrib on the upper surface, firm to subcoriaceous in texture, deep green, fading with tones of yellow, orange and brown: petioles 7^{mm}–2^{cm} long, margined, glandular or remotely glandular: flowers 15–18^{mm} wide, opening early in May and when the leaves are almost fully grown; they are disposed in simple, 3-6-flowered corymbs which terminate short leafy branchlets: pedicels and hypanthium glabrous or with several weak hairs: sepals 4–5^{mm} long, serrate, reflexed after anthesis: stamens varying in number, usually 12–15, the anthers nearly yellow: fruit, which ripens and falls in September and October, oval, 10–13^{mm} thick, red at maturity: nutlets mostly 2–3, 8–10^{mm} long, 4–5^{mm} measured dorso-ventrally, the lateral surfaces nearly plane: hypostyle about half the length of the nutlet.

Cratægus impar is abundant on a hillside, in clay soil, at Marietta, Georgia (type locality).

The original specimens, representing flowers (*B4288*) and fruit (*B4288*^{2}) from the same individual, are preserved in the Biltmore Herbarium.

Cratægus agrestina n. sp.

A small tree 4–5^{m} tall with a short trunk covered with dark gray or brownish bark, the spreading or ascending branches sometimes armed with chestnut-brown or gray spines 2–3.5^{cm} long; or more frequently a large shrub with one or more stems: leaves ovate, oval or obovate, the blades 2–5^{cm} long, 1–3.5^{cm} wide, acute at the apex, narrowed or contracted at the base, the borders sharply serrate and incised; they are glabrous at maturity, and when young bear some pubescence on both surfaces, especially along the lower portions of the midrib and largest veins or in their axils, bright or yellow-green, thin to firm in texture, fading

with tones of yellow, brown and orange: petioles 5mm–2cm long, margined, sometimes glandular: flowers 15–18mm wide, expanding about the middle of April and when the leaves are about one-fourth grown; they are produced in simple, glandular-bracteate, 3–5-flowered corymbs which terminate short, leafy branchlets: pedicels 5mm–1cm long, sparsely pubescent; hypanthium glabrous or with a few weak hairs at the base: sepals 3–4mm long, glandular, reflexed after anthesis: stamens about 20, the anthers nearly yellow: fruit, which ripens and falls the last of September or early in October, pyriform, 7–9mm thick, 9–12mm long, red at maturity: nutlets mostly 2–3, 5–6mm long, the lateral surfaces nearly plane: hypostyle a trifle less than half the length of the nutlet.

Cratægus agrestina grows in open woods and fields, or borders the swamps near Evergreen, Alabama (type locality).

The original specimens (*B2050* and *B3363*) are preserved in the Biltmore Herbarium.

Cratægus extraria n. sp.

A large shrub 2–4m tall, usually with several stems, clothed with dark gray or brownish, rough or scaly bark, the spreading or ascending branches freely armed with stout chestnut-brown or gray spines 3–5cm long: leaves oval, obovate, or on leading shoots, ovate or suborbicular, the blades 2–5cm long, 1.5–4cm wide, acute at the apex, narrowed or contracted, or on the shoots rounded at the base, the borders sharply serrate and incised; they are glabrous, or when young bear a few weak hairs on the upper surface on the lower portion of the midrib and bases of the principal veins, firm, to subcoriaceous in texture, bright but deep green, fading with tones of yellow, brown and orange: petioles 7mm–2cm long, margined, glandular: flowers 16–20mm wide, expanding early in May and when the leaves are three-fourths grown; they are disposed in simple, 3–5-flowered, glandular-bracteate corymbs which terminate short, leafy branchlets: pedicels and hypanthium pilose-pubescent: sepals 4–5mm long, usually glandular-serrate, reflexed after anthesis: stamens usually 12–15, the anthers pale purple: fruit which ripens and falls in September and October, subglobose or oval, 9–12mm thick, red at maturity: nutlets mostly

2–3, 8–10mm long, 4–5mm measured dorso-ventrally, the lateral surfaces nearly plane: hypostyle 4–5mm long.

Cratægus extraria grows on hillsides, mostly in red clay soil, at Marietta, Georgia (type locality).

The original specimens, representing flowers (*B4285*) and fruit (*B4285²*) from the same shrub, are preserved in the Biltmore Herbarium.

SORORIÆ

Leaves longer than broad
- Anthers yellow, white or cream-color
  - Pomes about 1cm or more in diameter
    - Fruit yellow and red, or orange-red with ruddy cheeks . . . . . *C. sororia* Beadle[27]
    - Fruit deep or bright red
      - Pedicels short, pubescent, at least at flowering time . . . . . *C. galbana*
      - Pedicels 1cm or more long, white-tomentose . *C. abdita*
  - Pomes 5–8mm in diameter . . . . . *C. exilis*
- Anthers purple or purplish
  - Inflorescence pubescent or slightly tomentose: leaves suborbicular, slightly pointed
    - Cavity 3–4mm wide: pomes 9–12mm in diameter. *C. consanguinea* Beadle[28]
    - Cavity 4–6mm wide: pomes 12–15mm in diameter . . . . . *C. valida*
  - Inflorescence glabrous: leaves more elongated, acutely pointed and with several tooth-like lobes . . . . . *C. limata*

Leaves broader than long . . . . . *C. mira*

Cratægus galbana n. sp.

A small tree 5–6m tall with a short trunk sometimes 1–1.5dm in diameter, clothed with dark gray or brownish-black bark; or more frequently a large shrub with one or more stems: branches spreading, crooked, frequently armed with stout, chestnut-brown or gray spines 1–2cm long: leaves oval, obovate or round-ovate, the blades 1–4cm long, 1–3cm wide, acute or rounded at the apex, rounded or contracted at the base, the margins irregularly dentate; they are glabrous at maturity, and when young show some pubescence along the midrib and veins on both surfaces, and especially near the base of the blade above and in the axils of the

[27] Bot. Gaz. **30**: 336, 1900.
[28] B. B. Studies **1**: 34, 1901.

lower veins beneath, yellow-green, becoming darker in age, firm in texture, fading in autumn with tones of yellow, brown and orange: petioles 7^{mm}–2^{cm} long, margined, glandular, more or less pubescent when young: flowers 15–20^{mm} wide, expanding early in April and when the leaves are about half grown; they are borne in simple, 1–5-flowered corymbs which terminate very short, leafy branchlets: pedicels short, like the hypanthium, pubescent: sepals 3–5^{mm} long, serrate and glandular: stamens 20, the anthers light yellow or nearly white: fruit, which ripens and falls in August and early in September, globose, 9–13^{mm} in diameter, at maturity red, the flesh orange-yellow, succulent: nutlets 3–5, about 8^{mm} long, 3.5–4.5^{mm} measured dorso-ventrally, the lateral surfaces nearly plane: hypostyle about half the length of the ventral angle.

(*ratægus galbana* grows in open woods and on the borders of swamps near River Junction, Florida (type locality).

The type specimens, representing flowers (*B2083*) and fruit (*H4969*) from the same tree, are preserved in the Biltmore Herbarium.

Cratægus abdita n. sp.

A shrub or small tree 3–6^{m} tall, the short trunk or main axis clothed with dark ashy-gray or brownish bark: branches frequently armed with stout chestnut-brown or gray spines 1–2^{cm} long: leaves obovate, oval or suborbicular, or on leading shoots sometimes broadly ovate, the blades 1.5–3.5^{cm} long, 1–3^{cm} wide, rounded or abruptly pointed at the apex, narrowed or contracted, or occasionally rounded at the base, the margins irregularly dentate; they are glabrous or glabrate at maturity, pubescent when young on both surfaces, especially along the midrib and principal veins and in their axils, bright green, firm in texture, fading with tones of yellow, orange and brown: petioles 7^{mm}–2^{cm} long, margined, glandular, pubescent, at least when young: flowers 15–20^{mm} wide, expanding early in April and when the leaves are about two-thirds grown; they are produced in simple, 3–5-flowered corymbs which terminate short, leafy branchlets: pedicels mostly 1–1.5^{cm} long, like the hypanthium, white-tomentose: sepals 5–6^{mm} long, serrate and glandular, reflexed after anthesis: fruit, which ripens and falls in August and early in September, globose,

10–15^{mm} in diameter, at maturity red, the flesh orange or orange-yellow, succulent: nutlets 3–5, 7–9^{mm} long, 3.5–5^{mm} measured dorso-ventrally, the lateral surfaces nearly plane: hypostyle 5–6^{mm} long.

Cratægus abdita is abundant in woods, mostly in sandy soil, near River Junction, Florida (type locality).

The type specimens, consisting of flowers (*B2082*) and fruit (*H4970*) from the same tree, are preserved in the Biltmore Herbarium.

Cratægus exilis n. sp.

A large shrub or small tree 3–6^{m} tall with a trunk sometimes 1–1.5^{dm} in diameter, clothed with dark gray or brownish, either rough or scaly bark, the spreading branches, which are usually armed with stout spines 1–2^{cm} long, forming an irregular, oval or flat-topped crown: leaves obovate, oval or elliptic, or on the shoots rhombic-ovate, the blades 1.5–4^{cm} long, 1–3.5^{cm} wide, acute or abruptly pointed at the apex, cuneate or contracted, rarely rounded at the base, the borders serrate and incised, or on leading shoots deeply lobed; they are glabrous at maturity, and when young are pubescent, especially on the midrib and bases of the principal veins above and in their axils beneath, firm to subcoriaceous in texture, bright green, fading in autumn with tones of yellow, brown and orange: petioles 5^{mm}–1.5^{cm} long, margined, minutely glandular, pubescent, at least when young: flowers about 15^{mm} wide, opening about the first of April and when the leaves are about one-fourth grown; they are disposed in simple or subsimple, 3–7-flowered corymbs, the lower branches of which arise from the axils of leaves: pedicels and hypanthium pilose-pubescent: sepals 3–4^{mm} long, lanceolate, serrate or entire, glandular, reflexed after anthesis: stamens 20, the anthers pale yellow: fruit, which ripens and falls in September, globose or subglobose, 5–7^{mm} wide, at maturity red or ruddy, the flesh thin: nutlets 3–5, 4–5^{mm} long, the lateral surfaces nearly plane: hypostyle about 3^{mm} long.

Cratægus exilis was collected at Albany, Georgia (type locality), growing in sandy soil and along the banks of the river.

The type specimens, flowers (*B4093*) and fruit (*B4093*^{2}) from the same tree are preserved in the Biltmore Herbarium.

Cratægus valida n. sp.

A large shrub or small tree 2–5^{m} tall with a short trunk 1–1.5^{dm} in diameter, clothed with gray or brownish rough or scaly bark, the stout, spreading or ascending branches frequently armed with chestnut-brown or gray spines 1–2^{cm} long: leaves obovate, oval or orbicular, the blades 2–5^{cm} long, 1.5–5^{cm} broad, or larger and broader than long on the shoots, rounded or abruptly pointed at the apex, contracted or rounded, or on strong shoots truncate or subcordate at the base, the margins irregularly dentate; they are glabrous or very nearly so at maturity, and when young bear a few weak hairs along the midrib and principal veins, especially on the upper surface, firm to subcoriaceous in texture, bright green, fading in autumn with tones of yellow, brown and orange: petioles 5–15^{mm} long, margined, glandular, pubescent: flowers 15–20^{mm} wide, opening after the middle of April and when the leaves are about one-third grown; they are produced in simple, 3–5-flowered corymbs, which terminate short leafy branchlets: pedicels and hypanthium sparsely pilose-pubescent: sepals 3–4^{mm} long, 1.5–2^{mm} wide, serrate, glandular, reflexed after anthesis: stamens 20, the anthers purple: fruit, which ripens in September and October, subglobose, 12–15^{mm} thick, the cavity 4–6^{mm} wide: nutlets 3–5, 8–9^{mm} long, 4–5^{mm} measured dorso-ventrally, the lateral surfaces nearly plane: hypostyle about 5^{mm} long.

Cratægus valida grows on a rocky hill at Rockmart, Georgia (type locality), and is peculiar on account of its stiff, stout branches and broad leaves.

The original specimens, which are preserved in the Biltmore Herbarium, represent both flowers (*B4155*) and fruit (*B4155*^{2}) from the same tree.

Cratægus limata n. sp.

A large shrub or small tree 2–5^{m} tall with one or more stems clothed with dark gray or brownish, either rough or scaly bark, the branches often armed with chestnut-brown or gray spines 2–4^{cm} long: leaves ovate, elliptic, obovate or suborbicular, the blades 2–4.5^{cm} long, 1.5–3.5^{cm} wide, acute or abruptly pointed at the apex, contracted or rounded at the base, the borders finely serrate and incised, or with tooth-like lobes; they are glabrous at maturity, and when young are more or less pubescent on the upper surface, especially near the base of the blade along the

midrib and bases of the largest veins and in the groove of the margined, glandular petioles, which are 5–15^{mm} long, firm to subcoriaceous in texture, yellow-green at maturity, bronze-red at the time of unfolding, fading in autumn with tones of yellow, brown and orange: flowers, which open about the middle of April, and when the leaves are about half grown, produced in simple, glandular-bracteate, 3–5-flowered corymbs: pedicels and hypanthium glabrous: sepals lanceolate, 4–6^{mm} long, serrate, glandular, reflexed after anthesis: stamens 20, the anthers purplish: fruit, which ripens in September, globose, 10–13^{mm} in diameter, red at maturity, the flesh orange-yellow, succulent: nutlets 3–5, about 6^{mm} long, 3^{mm} measured dorso-ventrally, the lateral surfaces nearly plane: hypostyle a little more than half the length of the ventral angle.

Cratægus limata was first collected at Warm Springs, Georgia (type locality), on September 8, 1899. Again in the spring of 1901 the original plants were visited and my earlier impressions of the validity of the species confirmed. Hills and dry woods, western and northwestern Georgia.

The type material (*B1139* and *B4130*) is preserved in the Biltmore Herbarium.

Cratægus mira n. sp.

A large shrub 2–3^{m} tall with one or more stems clothed with dark gray, rough or scaly bark, the branches armed with stout, chestnut-brown or gray spines 2–5^{cm} long: leaves orbicular or very broadly ovate, mostly broader than long, the blades 2–4^{cm} long, 2–5.5^{cm} wide, abruptly pointed at the apex, rounded or contracted, or on leading shoots truncate or cordate at the base, the borders dentate or serrate-dentate and incised or with tooth-like lobes; they are glabrous when fully grown, at the time of unfolding bearing some pubescence on the upper surface, especially near the base of the midrib, firm to subcoriaceous in texture, bright green, fading with tones of yellow, brown and orange: petioles 4–12^{mm} long, margined, glandular: flowers 16–20^{mm} wide, expanding early in May and when the leaves are more than half grown; they are produced in simple, 3–6-flowered corymbs which terminate short leafy branchlets: pedicels and hypanthium sparsely pilose: sepals 4–6^{mm} long, serrate, glandular, reflexed after anthesis: stamens varying in number, but usually 12–17, the anthers

nearly yellow: fruit, which ripens and falls in September and October, subglobose, 10–12^{mm} in diameter: nutlets 3–5, about 8^{mm} long, the lateral surfaces nearly plane: hypostyle 4–5^{mm} long.

Cratægus mira is truly a remarkable thorn. The dilated leaf-blades, which are almost invariably broader than long, present a character hitherto unnoticed in this section of the genus.

The original specimens, which are preserved in the Biltmore Herbarium, were collected at Marietta, Georgia, and represent both flowers (*B4287*) and fruit (*B4287*^{2}) from the same shrub.

VISENDÆ

Fruit pyriform, yellow or orange-yellow, often flushed or cheeked with red
- Leaves with very acute tooth-like lobes . . . . . *C. visenda*
- Leaves subentire or with blunt or rounded lobes
  - Blades suborbicular, abruptly contracted at the base . *C. sodalis*
  - Blades elongated, the base cuneiform . . . . . *C. furtiva*

Fruit subglobose or oval
- Fruit red or scarlet: anthers very small, bright purple . *C. arrogans*
- Fruit orange-red
  - Leaves with large blunt or rounded lobes . . . . . *C. egregia*
  - Leaves with numerous small, tooth-like lobes
    - Branches spreading or ascending
      - Inflorescence pubescent . . . . . *C. annosa*
      - Inflorescence glabrous . . . . . *C. calva*
    - Branches drooping
      - Anthers pink or pale purple: inflorescence pubescent
        - Leaves glandular-dentate and with tooth-like lobes . . . . . *C. tristis*
        - Leaves dentate and cleft . . . . . *C. quæsita* Beadle[29]
      - Anthers white: inflorescence densely white-woolly . . . . . *C. egens*

Cratægus visenda n. sp.

A tree sometimes 10^m tall with a trunk 2.5–3^{dm} in diameter covered with dark gray or brownish, rough bark, the crooked, nearly horizontal or ascending branches often armed with stout, chestnut-brown or gray spines 1–2^{cm} long: leaves ovate, obovate or orbicular, the blades 2–4^{cm} long, 1–3.5^{cm} wide, acute or abruptly pointed, or occasionally rounded at the apex, contracted at the base, the borders finely dentate and usually with several

[29] B. B. Studies I: 33, 1901.

acute, tooth-like lobes ; they are glabrous in age, and when young bear some pubescence on both surfaces, especially along the midrib and bases of the principal veins, firm to subcoriaceous in texture, bright green, fading with tones of yellow, orange and brown : petioles 5–15^{mm} long, margined, glandular : flowers 16–20^{mm} broad, opening about the last of March and when the leaves are more than half grown ; they are produced in simple, 3–6-flowered corymbs which terminate short leafy branchlets : stamens 20, the anthers pale purple : fruit, which ripens and falls in August and early in September, pyriform, 10–12^{mm} thick, 12–15^{mm} long, at maturity orange, diffused or cheeked with red, the flesh yellow or orange-yellow, soft : nutlets 3–5, mostly 3, 7–8.5^{mm} long, the lateral surfaces nearly plane : hypostyle two-thirds as long as the ventral angle.

Cratægus visenda grows in sandy soil near Bristol, Florida (type locality), where a number of very large individuals have been noticed.

The type specimens, consisting of flowers (*H4031*) and fruit (*H4903*) from the same tree, are preserved in the Biltmore Herbarium.

Cratægus sodalis n. sp.

A small tree or large shrub 3–5^{m} tall, often with two or more stems, with dark gray or brownish black, rough bark : branches stiff and mostly ascending, or the tips somewhat recurved : leaves obovate, oval or orbicular, the blades 1.5–2.5^{cm} long, 8^{mm}–2.5^{cm} wide, or larger on leading shoots, rounded or abruptly pointed at the apex, rounded or contracted, or on leading shoots truncate at the base, the borders minutely dentate and glandular, frequently with small tooth-like projections, especially on the largest leaves ; they are pubescent or glabrate, firm to subcoriaceous in texture, dull green, fading in autumn with tones of yellow and brown : petioles 5–15^{mm} long, margined, glandular, pubescent : flowers produced in simple, 3–5-flowered corymbs : pedicels 5^{mm}–1^{cm} long, pilose-pubescent : hypanthium pubescent : sepals 3–4.5^{mm} long, linear-lanceolate, glandular, serrate, reflexed after anthesis : stamens normally 20 : fruit, which ripens and falls in August and early in September, pyriform, 8–12^{mm} thick, 12–15^{mm} long, at maturity orange-red, the flesh orange-yellow, soft : nutlets mostly 3, about 8^{mm} long, the lateral surfaces nearly plane : hypostyle 5–6^{mm} long.

Cratægus sodalis grows in dry woods and on gravelly ridges at Girard, Alabama (type locality), standing in company with other species of this and the next group.

The original material (*B4868*) is deposited in the Biltmore Herbarium.

Cratægus furtiva n. sp.

A large shrub 2–4^{m} tall with dark, rough bark and drooping branches which are frequently armed with chestnut-brown or gray spines 1–2^{cm} long : leaves obovate, or on leading shoots broadly ovate, the blades 1–3^{cm} long, 7^{mm}–3^{cm} wide, narrowed or contracted at the base, pointed at the apex, the margins finely dentate or glandular, usually with a few short tooth-like lobes ; they are glabrate in age, subcoriaceous in texture, dull green, fading in autumn with tones of yellow and brown : petioles 5^{mm}–2^{cm} long, pubescent, winged, glandular : flowers produced in simple, few-flowered corymbs : pedicels 5^{mm}–1^{cm} long, pubescent or tomentose-pubescent, as is the hypanthium : sepals 3–4.5^{mm} long, glandular, mostly serrate : stamens normally 20 : fruit, which ripens and falls in August and early in September, pyriform, 7–12^{mm} thick, 12–15^{mm} long, at maturity orange, usually flushed or streaked with red, the flesh orange-yellow, soft : nutlets mostly 2–4, 6–7^{mm} long, the lateral surfaces nearly plane : hypostyle about 4^{mm} long.

Cratægus furtiva was found in sandy soil near Albany, Georgia (type locality).

The type material (*B4865*) is preserved in the Biltmore Herbarium.

Cratægus arrogans n. sp.

A tree 4–5^{m} tall with a short trunk 1.5–2^{dm} in diameter, clothed with dark, rough bark, the somewhat drooping branches frequently armed with stout, chestnut-brown or gray spines 1.5–3^{cm} long : leaves oval, elliptic, obovate or cuneate, or on leading shoots nearly orbicular, the blades 1–3.5^{cm} long, 7^{mm}–3^{cm} broad, acute or abruptly pointed at the apex, contracted or narrowed, or on the shoots rounded at the base, the borders finely dentate or glandular, usually with several short, acute, tooth-like projections or lobes ; they are glabrous or glabrate at maturity, and at the time of unfolding are more or less pubescent on both surfaces, especially along the midrib and principal veins, firm to subcoriaceous in texture, dull or even bright green, fading with

tones of yellow and brown: petioles 3–10^{mm} long, margined, glandular, pubescent: flowers, which appear about the middle of April and when the leaves are two-thirds or more grown, produced in simple, few-flowered corymbs: pedicels and hypanthium pubescent: sepals 3–4^{mm} long, glandular, mostly serrate, reflexed after anthesis: stamens 20, the anthers small, bright purple: fruit, which ripens about the first of September, short-oval or slightly pyriform, 9–12^{mm} thick, 11–13^{mm} long, red at maturity, the flesh orange-yellow, soft: nutlets mostly 3–4, about 8^{mm} long, the lateral surfaces nearly plane: hypostyle 5^{mm} long.

Crataegus arrogans grows in woods and on ridges from eastern central Alabama to northwestern Georgia. Apparently first collected by Professor C. S. Sargent at Girard, Alabama, April 19, 1900, and subsequently found by Mr. C. L. Boynton at Phœnix City, Alabama (type locality), and at Rockmart, Georgia.

The type material (*B4809*) is preserved in the Biltmore Herbarium.

Cratægus egregia n. sp.

A small tree 4–6^{m} tall with a short trunk sometimes 1–1.5^{dm} in diameter covered with dark and very rough bark: leaves ovate, oval or obovate, the blades 1.5–3.5^{cm} long, 7^{mm}–3^{cm} broad, acute at the apex, narrowed or contracted at the base, the borders glandular, broken by several large, shallow, blunt or rounded lobes; they are glabrous at maturity, firm to subcoriaceous in texture, dull to bright green, fading with tones of yellow, brown and orange: petioles 5–15^{mm} long, margined, glandular: flowers produced in simple, few-flowered corymbs: pedicels and hypanthium sparsely pilose-pubescent: sepals about 3^{mm} long, entire or sparingly serrate, glandular, reflexed after anthesis: stamens 15–20, the anthers white, tinged with rose: fruit, which ripens and falls about the end of August, subglobose, 10–12^{mm} in diameter, at maturity yellow or orange, sometimes flushed with red, the flesh orange-yellow, soft: nutlets 3–5, about 8^{mm} long, 4–5^{mm} measured dorso-ventrally, the hypostyle about 5^{mm} long.

Cratægus egregia, on account of the large, blunt or rounded lobes of the leaves, is a very distinct and extraordinary thorn. Grows in sandy soil near Bristol, Florida (type locality).

The original material (*H4924*) is preserved in the Biltmore Herbarium.

Cratægus annosa n. sp.

A tree sometimes 8^{m} tall with a trunk 3^{dm} in diameter clothed with dark, rough or rimose bark, the spreading or ascending branches frequently armed with stout chestnut-brown or gray spines $2–3^{cm}$ long: leaves obovate, oval or oblanceolate, or on leading shoots orbicular, the blades $2–4.5^{cm}$ long, $1–4^{cm}$ wide, mostly pointed at the apex, cuneate or more abruptly contracted, or on strong shoots rounded at the base, the borders dentate and glandular, mostly with several sharp, tooth-like lobes; they are glabrous or glabrate at maturity and when young are slightly pubescent on both surfaces, especially along the midrib and largest veins, firm in texture, bright green, fading in autumn with tones of yellow, orange and brown: petioles $5^{mm}–2^{cm}$ long, glandular, margined, pubescent, at least when young: flowers $15–20^{mm}$ wide, opening early in April and when the leaves are about half grown; they are disposed in simple, 3–5-flowered corymbs that terminate short, leafy branchlets: pedicels and hypanthium pubescent: sepals $3–4.5^{mm}$ long, serrate, glandular, reflexed after anthesis: stamens 20, the anthers nearly white: fruit, which ripens and falls the last of August and early in September, subglobose or oval, $10–12^{mm}$ in diameter, orange-red or red and orange when ripe, the flesh soft: nutlets 3–5, $7–8^{mm}$ long, the lateral surfaces nearly plane: hypostyle occupying about two-thirds of the ventral angle.

Cratægus annosa under favorable conditions develops into one of the largest trees of the "flava group," and is abundantly represented in eastern central Alabama, where, at Phœnix City (type locality), trees of great age sometimes attain remarkable proportions.

The type specimens, consisting of flowers (*B4103*) and fruit (*B4103²*) from the same tree, are preserved in the Biltmore Herbarium.

Cratægus calva n. sp.

A shrub $2–4^{m}$ tall with rough bark and ascending or spreading branches which are sometimes armed with stout chestnut-brown or gray spines $1–1.5^{cm}$ long: leaves obovate, oval or elliptic, the blades $1.5–3^{cm}$ long, $7^{mm}–2^{cm}$ broad, mostly pointed at the apex, narrowed or contracted, or occasionally rounded at the base, the borders dentate, glandular and usually with several tooth-like lobes; they are glabrous when fully grown and when young

bear a few weak hairs on both surfaces along the midrib and in the axils of the veins beneath, dull to bright green, thin to firm in texture, fading with tones of yellow, brown and orange: petioles 5–15^{mm} long, margined, glandular: flowers 16–18^{mm} wide, opening about the 10th of April and when the leaves are two-thirds grown; they are disposed in simple, 3–5-flowered corymbs which terminate short, leafy branchlets: pedicels and hypanthium glabrous: sepals 3–4^{mm} long, entire or glandular-serrate, reflexed after anthesis: stamens 20, the anthers light yellow or nearly white: fruit, which ripens and falls in September, globose, 7–10^{mm} in diameter, at maturity yellow or orange-red, the cheeks often bright red: nutlets 3–5, 5–6^{mm} long, the lateral surfaces nearly plane: hypostyle about 4^{mm} long.

Cratægus calva grows in woods and on ridges at Ozark, Alabama (type locality).

The original specimens, consisting of flowers (*H4117*) and fruit (*H5004*) from the same shrub, are preserved in the Biltmore Herbarium.

Cratægus tristis n. sp.

A large shrub or small tree 3–7^{m} tall, sometimes with a trunk 2^{dm} in diameter, clothed with dark or rimose rough, the drooping branches often armed with chestnut-brown or gray spines 2–3.5^{cm} long: leaves obovate, cuneate, broadly oval or suborbicular, the blades 1.5–4^{cm} long, 1–4^{cm} wide, pointed or rounded at the apex, narrowed or contracted or on leading shoots sometimes rounded at the base, the margins dentate and glandular; they are slightly pubescent when young, becoming glabrate in age, or with some persistent pubescence along the midrib and in the axils of the veins beneath, firm to subcoriaceous in texture, dull to bright green, fading in autumn with tones of yellow, brown and orange: petioles 5^{mm}–2^{cm} long, margined, pubescent, glandular: flowers 16–20^{mm} wide, opening near the end of April and when the leaves are less than half grown; they are produced in simple, glandular-bracteate, 3–5-flowered corymbs which terminate short, leafy branchlets: pedicels and hypanthium pubescent: sepals 4–5^{mm} long, glandular-serrate, reflexed after anthesis: stamens 20, the anthers pink: fruit, which ripens and falls the last of August and early in September, oval or short-oval, 10–12^{mm} thick, red

or orange-red at maturity, the flesh soft: nutlets 3–5, 8–9^{mm} long, the lateral surfaces nearly plane: hypostyle 6–7^{mm} long.

Cratægus tristis is abundantly represented on the hills about Rome, Georgia (type locality), and throughout the adjacent region. Apparently first collected by Mr. C. L. Boynton and the writer on September 19, 1899, and subsequently by Professor C. S. Sargent, April 22, 1900.

The type material, representing flowers (*B4149*) and fruit (*B4149*^{2}) from the same tree, is preserved in the Biltmore Herbarium.

Cratægus egens n. sp.

A tree 4–7^{m} tall with a trunk sometimes 2^{dm} in diameter, covered with dark, rough bark, the branches crooked and recurved: leaves obovate, cuneate or spatulate, the blades 1–3^{cm} long, 5^{mm}–2.5^{cm} wide, abruptly pointed at the apex, narrowed or contracted at the base, the borders dentate, glandular and with tooth-like lobes above the middle; they are glabrate at maturity and when young are more or less pubescent on both surfaces, especially on the midrib and prominent veins and in their axils, at first dull green, becoming bright green in age, firm to subcoriaceous in texture, fading in autumn with tones of yellow, brown and orange: petioles 3–15^{mm} long, glandular, pubescent, at least when young: flowers 14–18^{mm} wide, opening about the first of April and when the leaves are half to two-thirds grown; they are either solitary or in simple, 2–4-flowered corymbs which terminate short, leafy branchlets: pedicels and hypanthium densely white-woolly: sepals 3–4^{mm} long, glandular-serrate, reflexed after anthesis: stamens 20, the anthers almost white: fruit, which ripens and falls about the last of August, subglobose or slightly oval, 9–11^{mm} thick, at maturity orange-red with ruddy cheeks, the flesh orange-yellow, succulent: nutlets 3–5, about 7^{mm} long, the lateral surfaces nearly plane: hypostyle about 5^{mm} long.

Cratægus egens grows in sandy soil near Bristol, Florida (type locality), and was first collected in the same region by Dr. A. W. Chapman, possibly ten years ago. Later specimens, which are preserved in the Biltmore Herbarium, and made by Mr. T. G. Harbison, April 1, 1901 (*H4037*) and August 23, 1901 (*H4909*), both from the same tree, have been used as the basis of the description.

MICHAUXIANÆ.

Leaves abruptly contracted at the base . . . . . *C. michauxi* Pers.[80]
Leaves with long cuneate bases . . . . . *C. lanata*

[80] Syn. Pl. **2**: 38, 1807.

Cratægus lanata n. sp.

A large shrub or small tree 2–5^{m} tall with a short trunk 1–1.5^{dm} in diameter, clothed with dark, rough or rimose bark, the drooping branches sometimes armed with stout, chestnut-brown or gray spines 1.5–2.5^{cm} long: leaves cuneate, the blades 2–4^{cm} long, 7^{mm}–2^{cm} wide, or on leading shoots often larger and broader than long, mostly pointed at the apex, cuneate at the base, the borders glandular and usually broken above the middle by one or more short, point-like lobes; they are tomentose, at least on the lower surface at maturity, and when young are more densely coated with tomentum, dull green, firm to subcoriaceous in texture, fading with tones of brown, orange and yellow: petioles 5–15^{mm} long, winged, glandular, tomentose: flowers, which open after the middle of April and when the leaves are about half grown, produced in simple, mostly 2–4-flowered corymbs: pedicels and hypanthium densely tomentose: sepals 4–5^{mm} long, narrowly lanceolate or almost linear, glandular, serrate: stamens 20, the anthers light yellow or nearly white: fruit, which ripens and falls in August, globose, 8–11^{mm} in diameter: nutlets 3–5, 6–7^{mm} long, the lateral surfaces nearly plane: hypostyle about 5^{mm} long.

Cratægus lanata is represented in many herbaria and especially by the specimens distributed by Mr. A. H. Curtiss (*No. 6520*) from near Stone Mountain, Georgia. Grows in rocky woods and sandy soil from the valley of Yellow river to northern Georgia and western North Carolina.

The type material, which is preserved in the Biltmore Herbarium, was collected near the banks of Yellow river, below McGuire's Mill, Gwinnett county, Georgia, April 5, 1901 (*B4145*) and June 21, 1899 (*B587*).

INTEGRÆ

Fruit red
- Anthers light yellow: calyx-lobes and tube deciduous . . . . . *C. integra*
- Anthers pale purple: calyx persistent . . . . . *C. adunca*

Fruit yellow, orange or orange-red, the cheeks often flushed
- Pubescence of the corymbs copious but thin
  - Pomes subglobose, the flesh attenuate with the pedicel . . . *C. constans*
  - Pomes depressed-globose, the flesh depressed about the pedicel . *C. panda*
- Pubescence of the corymbs densely white-woolly
  - Vernal leaves bright green: pedicels at maturity 1^{cm} or more long
    - Mature leaves subcoriaceous, conspicuously margined with black glands . . . . . *C. dapsilis*
    - Mature leaves thinner, not very glandular . . . . . *C. dolosa*
  - Vernal leaves gray-green: pedicels very short . . . . . *C. rava*

CRATÆGUS INTEGRA (Nash)

Cratægus flava integra Nash, Bull. Torr. Bot. Club **22**: 150, 1895.

A small tree 4–5^{m} tall with a trunk 1–2^{dm} in diameter, clothed with ashy-gray or dark, rough bark, the drooping branches infrequently armed with short, stout spines: leaves obovate or cuneate, the blades 1.5–4^{cm} long, 7^{mm}–2.5^{cm} wide, pointed or occasionally rounded at the apex, contracted or narrowed at the base, the margins glandular, sometimes bluntly or undulately lobed; they are pubescent on the lower surface at maturity, glabrate or glabrous above, and at the time of unfolding are but slightly pubescent on the upper surface, pubescent beneath, especially along the midrib and in the axils of the largest veins, bright green and eventually somewhat lustrous on the upper surface, firm to subcoriaceous in texture, fading in autumn with tones of yellow, orange and brown: petioles 5^{mm}–2^{cm} long, margined, glandular, pubescent: flowers, which expand about the 20th of March and when the leaves are about two-thirds grown, 15–20^{mm} wide, disposed in simple, 3–5-flowered corymbs: pedicels and hypanthium densely white-tomentose: sepals 4–5^{mm} long, glandular, serrate, reflexed after anthesis: stamens 20, the anthers light yellow: fruit, which ripens and falls in August, globose, 10–15^{mm} in diameter, at maturity red, the flesh orange-yellow, succulent: nutlets 3–5, about 8^{mm} long, the lateral surfaces nearly plane: hypostyle 5–6^{mm} long.

Cratægus integra grows in sandy woods and old fields in central peninsular Florida.

Cratægus adunca n. sp.

A large shrub or small tree 2–5^{m} tall, sometimes with a short trunk 1–1.5^{dm} in diameter, clothed with ashy-gray or dark scaly or rough bark, the crooked branches spreading and somewhat recurved, occasionally armed with chestnut-brown or gray spines 1.5–2.5^{cm} long: leaves obovate, 2–3^{cm} long exclusive of the petioles, 7^{mm}–2.5^{cm} wide, or larger on leading shoots, abruptly pointed or rounded at the apex and with a small tooth-like point, contracted or narrowed at the base, the borders minutely dentate or nearly entire, glandular, sometimes with shallow, tooth-like lobes; they are glabrous or glabrate at maturity, and when young are pubescent along the midrib and principal

veins on both surfaces, bright green, firm in texture, fading in autumn with tones of yellow, brown and orange: petioles 5–15^{mm} long, margined, glandular, pubescent, at least when young: flowers 15–20^{mm} wide, opening about the first of April and when the leaves are two-thirds grown; they are produced in simple, 3–5-flowered corymbs which terminate short, leafy branchlets: pedicels and hypanthium tomentose-pubescent: sepals 4–5^{mm} long, serrate, glandular, reflexed after anthesis: stamens 20, the anthers pale purple: fruit, which ripens the last of August and early in September, globose, 12–15^{mm} in diameter, red at maturity, the flesh orange, succulent: nutlets 3–5, 7–8^{mm} long, the lateral surfaces nearly plane: hypostyle 4–5^{mm} long.

Cratægus adunca grows in sandy woods at Tallahassee, Florida (type locality).

The type specimens, representing flowers (*H4063*) and fruit (*H4941*) from the same individual, are preserved in the Biltmore Herbarium.

Cratægus constans n. sp.

A shrub 2–4^{m} tall with dark gray, either scaly or rough bark and crooked, recurved branches which are frequently armed with chestnut-brown or gray spines 1–2.5^{cm} long: leaves obovate or cuneate, the blades 1.5–4^{cm} long, 7^{mm}–3^{cm} wide, abruptly pointed at the apex, narrowed or contracted at the base, the borders glandular, minutely dentate or entire; they are glabrate or pubescent at maturity, and when young are pubescent on both surfaces, especially the lower and along the midrib and principal veins, bright to dark green, somewhat lucid above, firm in texture, fading with tones of yellow, brown and orange: petioles 5^{mm}–2^{cm} long, margined, glandular, pubescent: flowers 16–20^{mm} wide, opening during the latter part of April and when the leaves are two-thirds grown; they are produced in simple, 3–5-flowered corymbs which terminate short, leafy branchlets: pedicels 1–2.5^{cm} long, like the hypanthium, pubescent: sepals 4–5^{mm} long, serrate, glandular, reflexed after anthesis: stamens 20, the anthers nearly yellow: fruit, which ripens and falls the last of August and early in September, subglobose or slightly pyriform, 10–12^{mm} thick, deep but bright orange-red at maturity, the flesh orange-yellow, succulent: nutlets 3–5, about 7^{mm} long, the lateral surfaces nearly plane: hypostyle about 5^{mm} long.

Cratægus constans grows in sandy soil in woods at Columbus, Mississippi (type locality).

The original specimens, representing flowers (*H4187*) and fruit (*H5066*) from the same shrub, are preserved in the Biltmore Herbarium.

Cratægus panda n. sp.

A tree sometimes 6–7^{m} tall with a trunk 3^{dm} in diameter, covered with dark, rough bark, the crooked, recurved branches infrequently armed with short, stout spines 1–2^{cm} long: leaves obovate or cuneate, the blades 2–4^{cm} long, 1–2.5^{cm} wide, or broader on leading shoots, pointed or rounded and with an abrupt, sharp point at the apex, contracted or narrowed at the base, the borders nearly entire; they are glabrous or glabrate at maturity and when young are pubescent on both surfaces, especially on the midrib and principal veins and in their axils, bright green and somewhat lucid on the upper surface in age, firm to subcoriaceous in texture, fading with tones of yellow, brown and orange: petioles 5–15^{mm} long, margined, glandular, pubescent, at least when young: flowers 15–20^{mm} wide, opening about the first of April and when the leaves are about two-thirds grown; they are produced in simple, 3–5-flowered corymbs which terminate short, leafy branchlets: pedicels and hypanthium pubescent: sepals 4–5^{mm} long, serrate, glandular, reflexed after anthesis: stamens 20, the anthers almost white: fruit, which ripens and falls towards the end of August and early in September, globose or depressed-globose, 10–15^{mm} in diameter, at maturity orange-yellow, often tinged or cheeked with red, the flesh orange-yellow, succulent: nutlets 3–5, about 7^{mm} long, the lateral surfaces nearly plane: hypostyle about 5^{mm} long.

Cratægus panda grows in dry sandy soil at Tallahassee, Florida (type locality).

The type material, which is deposited in the Biltmore Herbarium, represents both flowers (*H4051*) and fruit (*H4947*) from the same tree.

Cratægus dapsilis n. sp.

A shrub or small tree 2–5^{m} tall, sometimes with a short trunk 1.5^{dm} in diameter, covered with ashy-gray, rough bark, the drooping or recurved branches sometimes armed with chestnut-brown or gray spines 1–3^{cm} long: leaves obovate or cuneate, the blades 1.5–4^{cm} long, 7^{mm}–2.5^{cm} wide, or larger on the shoots, rounded or

slightly and abruptly pointed at the apex, contracted and narrowed, or on leading shoots sometimes rounded at the base, the borders entire, glandular; they are more or less pubescent at maturity, especially on the lower surface along the midrib and in the axils of the veins, bright green at flowering time, becoming subcoriaceous in texture and fading with tones of yellow and brown: petioles 5–15^{mm} long, margined, glandular, pubescent, at least when young: flowers 15^{mm}–2^{cm} wide, opening about the 20th of March and when the leaves are about three-fourths grown; they are solitary, or more frequently in 2–4-flowered corymbs which terminate short, leafy branchlets: pedicels and hypanthium densely white-tomentose: sepals 4–5^{mm} long, glandular, slightly serrate, reflexed after anthesis: fruit, which ripens and falls from the middle to the end of August, globose or subglobose, 10–15^{mm} in diameter, at maturity yellow or orange, mostly flushed or cheeked with red, the flesh soft: nutlets 3–5, 8–9^{mm} long, the lateral surfaces nearly plane: hypostyle 5-6^{mm} long.

Cratægus dapsilis grows in sandy soil in central peninsular Florida. The type specimens (*B4836*), which are preserved in the Biltmore Herbarium, were gathered at Lane Park, near Tavares.

Cratægus dolosa n. sp.

A shrub or small tree 2–6^{m} tall with ashy-gray, rough or scaly bark, the spreading or recurved branches sometimes armed with chestnut-brown or gray spines 1.5–3^{cm} long: leaves obovate, or on leading shoots broadly ovate or orbicular, the blades 1.5–4^{cm} long, 1–3^{cm} wide, or broader on the shoots, rounded or abruptly pointed at the apex, contracted or narrowed, or on vigorous shoots rounded at the base, the borders minutely dentate or nearly entire; they are glabrous, or but slightly pubescent at maturity, and when young are sparingly pubescent on both surfaces, especially on the midrib and principal veins, bright green, firm in texture, fading with tones of yellow, brown and orange: petioles 5^{mm}–2^{cm} long, margined, glandular, pubescent, at least when young: flowers 18–20^{mm} wide, opening early in April and when the leaves are almost fully grown; they are borne in simple, 3–5-flowered corymbs which terminate short, leafy branchlets:

pedicels and hypanthium tomentose: sepals 4–5^{mm} long, serrate, glandular, reflexed after anthesis: stamens 20, the anthers light yellow or nearly white: fruit, which ripens and falls early in September, subglobose or short-oval, 9–12^{mm} thick, yellow or orange at maturity, sometimes with flushed cheeks: nutlets 3–5, 7–8^{mm} long, the lateral surfaces nearly plane: hypostyle about 5^{mm} long.

Cratægus dolosa grows in dry woods at Abbeville, Henry country, Alabama (type locality).

The original specimens, which are preserved in the Biltmore Herbarium, represent flowers (*H4110*) and fruit (*H5036*) from the same individual.

Cratægus rava n. sp.

A shrub or small tree 2–5^{m} tall with a short trunk sometimes 1.5^{dm} in diameter, covered with ashy-gray, either rough or scaly bark, the crooked, slightly drooping branches often armed with stout, chestnut-brown or gray spines 1.5–3^{cm} long: leaves obovate, cuneate or spatulate, the blades 1–3^{cm} long, 7^{mm}–2.5^{cm} wide, rounded and mostly with a short abrupt point at the apex, narrowed or contracted at the base, the borders glandular and nearly entire; they are pubescent or glabrate at maturity, and when young are gray-green and pubescent on both surfaces, especially on the midrib and veins and in their axils, becoming bright green, firm to subcoriaceous in texture, fading with tones of yellow, orange and brown: petioles 5–15^{mm} long, margined, glandular, pubescent, at least when young: flowers 15^{mm}–2^{cm} wide, expanding early in April, and when the leaves are about half grown; they are sometimes solitary, but mostly in 2–4-flowered corymbs which terminate short, leafy branchlets or fascicles of leaves: pedicels very short, like the hypanthium, densely tomentose: sepals 4–5^{mm} long, serrate, glandular, reflexed after anthesis: stamens 20, the anthers light yellow or almost white: fruit, which ripens and falls about the last of August, globose or subglobose, 10–12^{mm} in diameter, when ripe yellow or orange-yellow, cheeked or splotched with red, the flesh succulent: nutlets 3–5, about 7^{mm} long, the lateral surfaces nearly pale: hypostyle about 5^{mm} long.

Cratægus rava was found in open woods, mostly in sandy soil, near Tallahassee, Florida (type locality).

The original specimens, representing flowers (*H4064*) and fruit (*H4942*) from the same tree, are preserved in the Biltmore Herbarium.

DENTATÆ

Fruit red at maturity
- Flowers 2–2.5cm broad: calyx-lobes 6–8mm long
  - Pomes oval, 1.5–2cm long: anthers yellow . . . *C. alabamensis* Beadle[31]
  - Pomes subglobose, 1–1.5cm thick: anthers pale purple . . . . . *C. fortis*
- Flowers smaller: calyx-lobes shorter
  - Inflorescence densely woolly: leaves contracted at the base . . . . . *C. compitalis*
  - Inflorescence pubescent: leaves cuneate . . . *C. insidiosa*

Fruit yellow, orange or orange-red, the cheeks often red
- Pedicels clothed with white spreading hairs: flowers 2–2.5cm wide
  - Leaves sharply dentate, mostly pointed . . . . *C. florens*
  - Leaves crenate-dentate, mostly obtuse . . . . *C. clara*
- Pubescence of the pedicels white-woolly
  - Anthers very small, less than 1mm long
    - Leaf margins very glandular: petioles short. *C. pulla.*
    - Leaf margins slightly glandular: petioles long . . . . . : *C. inops*
  - Anthers larger: flowers 2–2.5cm broad
    - Nutlets 6–7mm long . . . . . *C. amica*
    - Nutlets 7–9mm long . . . . . *C. raveneli* Sargent[32]

Cratægus fortis n. sp.

A large shrub or occasionally a small tree 2–5m tall with ashy-gray or brownish, rough or scaly bark: leaves obovate or obovate-cuneiform, the blades 2–4cm long, 1–3cm wide, or broader on leading shoots, rounded or abruptly pointed at the apex, narrowed or contracted at the base, the borders dentate; they are glabrate at maturity and when young are sparsely pubescent on both surfaces, especially along the midrib and veins, bright green, subcoriaceous in texture, fading with tones of yellow, brown and orange: petioles 5–15mm long, margined, glandular, pubescent, at least when young: flowers 2–2.5cm wide, expanding towards the end of April and when the leaves are about three-fourths grown; they are disposed in simple, 3–5-flowered corymbs which terminate short, leafy branchlets: pedicels and hypanthium tomentose-pubescent: sepals 6–8mm long, serrate, glandular, reflexed after anthesis: stamens 20, the anthers pale purple: fruit, which ripens

[31] Bot. Gaz. **30**: 342, 1900.
[32] Bot. Gaz. **33**: 122, 1902.

and falls from the middle of September to the first of October, subglobose or short-oval, 10–15^{mm} thick, red at maturity, the flesh soft: nutlets 3–5, about 8^{mm} long, the lateral surfaces nearly plane: hypostyle about three-fourths the length of the ventral angle.

Cratægus fortis grows in sandy woods bordering the Tombigbee river, near Columbus, Mississippi (type locality).

The original specimens, consisting of flowers (*H4178*) and fruit (*H5067*) from the same tree, are preserved in the Biltmore Herbarium.

Cratægus compitalis n. sp.

A small tree or oftener a large, much-branched shrub, 2–5^{m} tall, the short trunk or main stems covered with dark gray or brownish rough bark: branches irregular, recurved or only drooping at the tips, sometimes armed with chestnut-brown or gray spines 1–2^{cm} long: leaves obovate or obovate-cuneiform, the blades 2–4^{cm} long, 1–3^{cm} wide, rounded or with a small abrupt point at the apex, usually contracted at the base, the borders dentate or serrate-dentate; they are nearly or quite glabrous in age, and when young are pubescent on both surfaces, especially along the midrib and principal veins and in their axils, bright green, firm to subcoriaceous in texture, fading in autumn with tones of yellow and brown: petioles 5–15^{mm} long, margined, glandular, pubescent, at least when young: flowers 15–18^{mm} wide, expanding about the last of March and when the leaves are one-fourth grown; they are produced in simple, mostly 3–5-flowered corymbs which terminate short, leafy branchlets or fascicles of leaves: pedicels and hypanthium densely-tomentose: sepals 4–5^{mm} long, serrate, glandular, reflexed after anthesis: stamens 20, the anthers light yellow or nearly white: fruit, which ripens and falls from the middle to the end of August, subglobose or oval, 10–13^{mm} thick, red when fully ripe, the flesh soft: nutlets 3–5, 8–9^{mm} long, the lateral surfaces nearly plane: hypostyle 6–7^{mm} long.

Cratægus compitalis grows along the roadsides near Gainesville, Florida (type locality), where the species is not uncommon.

The type material, consisting of flowers (*B4060*) and fruit (*B4060*^{2}) from the same tree, is preserved in the Biltmore Herbarium.

Cratægus insidiosa n. sp.

A large shrub or small tree 4–7^{m} tall with a trunk sometimes 2–3^{dm} in diameter, clothed with dark gray or brownish, rough or rimose bark, the crooked, recurved branches frequently armed with chestnut-brown or gray spines 1.5–3^{cm} long: leaves cuneate, 2–4^{cm} long exclusive of the petioles, 1–2^{cm} wide, or broader on leading shoots, blunt or abruptly pointed, or sometimes shallowly lobed at the apex, wedge-shaped at the base, the borders glandular and dentate near the apex; they are pubescent or glabrate at maturity, and when young are more or less pubescent on both surfaces, especially along the midrib and prominent veins and in their axils, bright green, firm to subcoriaceous in texture, fading with tones of yellow and brown: petioles 5^{mm}–2^{cm} long, margined, glandular, pubescent, at least when young: flowers 16–20^{mm} wide, opening in early April and when the leaves are almost fully grown; they are sometimes solitary, but usually in 2–4-flowered, simple corymbs which terminate leafy branchlets: pedicels and hypanthium pubescent: sepals 4–5^{mm} long, glandular, usually serrate, reflexed after anthesis: stamens 20, the anthers light yellow or almost white: fruit, which ripens and falls the last of August and early in September, oval or subglobose, 9–12^{mm} thick, at maturity red, the flesh soft: nutlets 3–5, 7–8^{mm} long, the lateral surfaces nearly plane: hypostyle about 5^{mm} long.

Cratægus insidiosa was found in dry sandy upland woods at Ozark, Alabama (type locality), and at other stations in the same general region of the same state and Georgia.

The type specimens, which are preserved in the Biltmore Herbarium, represent flowers (*H4115*) and fruit (*H5008*) from the same tree.

Cratægus florens n. sp.

A small tree or large shrub 3–6^{m} tall with a short trunk occasionally 1.5–2^{dm} in diameter, clothed with dark rimose bark, the crooked, recurved branches, which are sometimes armed, forming a wide, spreading top: leaves obovate, oblong-cuneate, or on leading shoots suborbicular, the blades 2–5.5^{cm} long, 1–3^{cm} wide, or broader on the shoots, pointed or rounded at the apex, narrowed or contracted at the base, the borders dentate or serrate-dentate; they are pubescent or glabrate in age, and when young

are more or less pubescent on both surfaces, especially at the time of unfolding, bright green, firm to subcoriaceous in texture, fading with tones of yellow, orange and brown: petioles 5^{mm}–2^{cm} long, margined, glandular, pubescent: flowers very large, 20–25^{mm} wide, opening about the 25th of April and when the leaves are almost or even fully grown; they are produced in simple or subsimple, 3–6-flowered corymbs which terminate short, leafy, spur-like branchlets: pedicels and hypanthium pilose-pubescent: sepals 6–8^{mm} long, glandular-serrate, reflexed after anthesis: stamens 20, the anthers light yellow: fruit, which ripens about the middle of September, subglobose, 10–15^{mm} thick, orange-red at maturity, the flesh soft: nutlets 3–5, about 8^{mm} long, the lateral surfaces nearly plane: hypostyle 5–6 ^{mm} long.

Cratægus florens is one of the most handsome thorns of the "flava group," especially noteworthy on account of the ample leaves and large flowers which are freely produced, and the wealth of showy fruits.

The type material, which is deposited in the Biltmore Herbarium (*H4176* & *H5065*), was collected at Columbus, Mississippi.

Cratægus clara n. sp.

A small tree 4–6^{m} tall with dark gray or brownish rough bark, or more frequently a large much-branched shrub with one or more stems: branches usually armed with stout, chestnut-brown or gray spines 1.5–2.5^{cm} long: leaves obovate or obovate-cuneate, the blades 2–4^{cm} long, 1–2^{cm} broad, or larger on vigorous shoots, rounded or pointed at the apex, narrowed or sometimes more abruptly contracted at the base, the borders dentate or crenate-dentate; they are slightly pubescent beneath in age, lustrous above and when young are more or less pubescent on both surfaces, especially along the midrib and veins and in their axils, bright green, eventually subcoriaceous in texture, fading with tones of yellow, orange and brown: petioles 5–15^{mm} long, margined, glandular, pubescent, at least when young: flowers 15–18^{mm} wide, opening early in April and when the leaves are about two-thirds grown; they are produced in simple, 3–5-flowered corymbs which terminate short, leafy branchlets: pedicels and hypanthium pubescent: sepals 4–5^{mm} long, serrate, glandular, reflexed after anthesis: stamens 20, the anthers white or very faintly tinged with

purple: fruit, which ripens in September, globose, 9–12^{mm} in diameter, orange-red when ripe: nutlets 3–5, about 7^{mm} long, the lateral surfaces nearly plane: hypostyle about 5^{mm} long.

Cratægus clara is common in sandy soil in oak woods between Chattahoochee and Bristol, Florida (type locality).

The type material (*H4916*) is preserved in the Biltmore Herbarium.

Cratægus pulla n. sp.

A large shrub or small tree 3–5^{m} tall, sometimes with a trunk 1.5^{dm} in diameter, covered with dark rimose bark, the recurved or pendulous branches infrequently armed: leaves obovate, cuneate, elliptic or on leading shoots suborbicular, the blades 1.5–3^{cm} long, 7^{mm}–3^{cm} wide, either pointed, rounded or lobed at the apex, narrowed or contracted or on the shoots rounded at the base, the borders dentate, glandular; they are pubescent at maturity and when young are more densely coated with soft hairs, especially along the midrib and principal veins and in their axils, dark, dingy green, firm to subcoriaceous in texture, fading with tones of yellow and brown: petioles 5–12^{mm} long, pubescent, margined, glandular: flowers 14–17^{mm} wide, opening about the 25th of April and when the leaves are two-thirds grown; they are produced in simple, 2–5-flowered corymbs which terminate short, leafy, spur-like branchlets: pedicels and hypanthium tomentose: sepals 4–6^{mm} long, glandular-serrate, reflexed after anthesis: stamens 20, the anthers light yellow: fruit, which ripens and falls in September, subglobose or oval, 9–12^{mm} thick, 10–14^{mm} long, at maturity yellow or orange-yellow flushed with red, the flesh soft: nutlets 3–5, about 8^{mm} long, the lateral surfaces nearly plane: hypostyle occupying about three-fourths of the ventral angle.

Cratægus pulla grows in sandy soil along the Tombigbee river at Columbus, Mississippi (type locality).

The original specimens, consisting of flowers (*H4188*) and fruit (*H5063*), are preserved in the Biltmore Herbarium.

Cratægus inops n. sp.

A small tree sometimes 6–7^{m} tall with a trunk 2^{dm} in diameter clothed with rough or rimose bark, the spreading or recurved branches frequently armed with gray or chestnut-brown spines

1–2^{cm} long: leaves cuneate, 1.5–3.5^{cm} long exclusive of the petioles, 7^{mm}–2.5^{cm} wide, or broader on leading shoots, rounded, abruptly pointed or lobed at the apex, wedge-shaped or more abruptly contracted at the base, the margins dentate above the middle; they are pubescent on the lower surface at maturity, especially along the midrib and principal veins and when young are pubescent on both surfaces, bright green, thin to firm in texture, fading with tones of yellow, brown and orange: petioles 5^{mm}–2.5^{cm} long, pubescent, margined, glandular: flowers 18–20^{mm} wide, opening early in April and when the leaves are almost fully grown; they are produced in simple, 3–5-flowered corymbs which terminate short leafy branchlets: pedicels and hypanthium tomentose: sepals 3–4^{mm} long, serrate, glandular, reflexed after anthesis: stamens 20, the anthers light yellow or nearly white: fruit, which ripens and falls during the last of August and early in September, globose, 10–14^{mm} in diameter, at maturity orange, flushed or diffused with red, the flesh soft: nutlets 3–5, about 7^{mm} long, the lateral surfaces nearly plane: hypostyle about 5^{mm} long.

Cratægus inops grows in dry sandy soil in oak woods at Ozark, Alabama (type locality).

The original specimens, which are preserved in the Biltmore Herbarium, consist of flowers (*H4113*) and fruit (*H5003*) from the same tree.

Cratægus amica n. sp.

A small tree or large shrub 3–6^{m} tall, sometimes with a short trunk 2.5^{dm} in diameter covered with dark, rough or rimose bark, the recurved branches infrequently armed: leaves cuneate or oblong-cuneiform, or on leading shoots broadly ovate, the blades 1.5–3.5^{cm} long, 7^{mm}–2.5^{cm} wide, or broader on the shoots, mostly pointed or lobed at the apex, narrowed or contracted at the base, the glandular borders dentate above the middle; they are pubescent when young and at maturity are lucid, bright green and glabrate on the upper surface, pale green and pubescent beneath, especially along the midrib and veins, firm to subcoriaceous in texture, fading in autumn with tones of yellow, orange and brown: petioles 5^{mm}–2.5^{cm} long, margined, glandular, pubescent, at least when young: flowers about 2^{cm} wide, opening about the 20th of March and when the leaves are two-thirds grown; they

are produced in simple, 3–5-flowered corymbs which terminate short leafy branchlets: pedicels and hypanthium densely tomentose: sepals about 5^{mm} long, glandular serrate, reflexed after anthesis: stamens 20, the anthers light yellow: fruit, which ripens and falls in August, subglobose, $10–13^{mm}$ thick, at maturity orange, blotched or cheeked with red, the flesh soft: nutlets 3–5, $6–7^{mm}$ long, the lateral surfaces nearly plane: hypostyle occupying three-fourths of the ventral angle.

Cratægus amica was collected in sandy woods and along the borders of roads at Ocala, Florida (type locality).

The original specimens, representing flowers (*B4004*) and fruit (*B4004*^{2}) from the same tree, are preserved in the Biltmore Herbarium.

ATTRITÆ

Spines $1–2^{cm}$ long: leaves very irregularly and coarsely dentate . *C. attrita*
Spines longer: leaves finely serrate-dentate . . . . . *C. teres* Beadle[33]

Cratægus attrita n. sp.

A shrub or small tree $2–5^{m}$ tall, sometimes with a slender trunk $1–1.5^{dm}$ in diameter covered with dark, rough or rimose bark, the recurved, crooked branches often armed with gray or chestnut-brown spines $1.5–2.5^{cm}$ long: leaves cuneate or obovate-cuneiform, the blades $2–3.5^{cm}$ long, $7^{mm}–3^{cm}$ wide, truncate, blunt or even sharp-pointed at the apex, narrowed or contracted at the base, the margins coarsely and irregularly dentate, especially above the middle; they are glabrous or glabrate at maturity, and when young are sparsely pubescent on both surfaces, eventually firm or subcoriaceous in texture, bright green, fading with tones of yellow, orange and brown: petioles $5^{mm}–2^{cm}$ long, pubescent, margined, glandular: flowers $20–22^{mm}$ wide, opening early in April and when the leaves are two-thirds or more grown; they are either solitary or in 2–3-flowered corymbs which terminate short, leafy branchlets or leafy fascicles: pedicels and hypanthium bearing a few weak hairs: sepals about 5^{mm} long, glandular-serrate or nearly entire: stamens 20, the anthers light yellow or nearly white: fruit, which ripens and falls towards the end of August or early in September, subglobose, $10–14^{mm}$ thick, at maturity yellow, splashed with red, the flesh soft:

[33] B. B. Studies I: 43, 1901.

nutlets 3–5, 7–9^{mm} long, the lateral surfaces nearly plane: hypostyle two-thirds as long as the ventral angle.

Cratægus attrita grows in sandy upland woods at Ozark, Alabama (type locality).

The original specimens, which are preserved in the Biltmore Herbarium, represent flowers (*H4116*) and fruit (*H5009*) from the same individual.

SENTÆ

Leaf-blades with long cuneate bases
  Fruit red . . . . . *C. senta* Beadle[34]
  Fruit orange with ruddy cheeks . . . . . *C. cullasagensis* Ashe[35]
Leaf-blades suborbicular with rounded or abruptly contracted bases . . . . . *C. dispar* Beadle[36]

ANISOPHYLLÆ

Fruit orange, often with flushed cheeks . . . . . *C. anisophylla*
Fruit red or reddish
  Vernal leaves slightly pubescent or glabrate
    Leaf-borders subentire . . . . . *C. frugalis*
    Leaves lobed and toothed . . . . . *C. viaria*
  Vernal leaves scurfy-tomentose
    Anthers yellow: fruit globose or subglobose
      Leaves conspicuously lobed, toothed and crisped . . . *C. cirrata*
      Leaves subentire or with shallow lobes and teeth . . . *C. arguta*
    Anthers white: fruit subglobose or oval . . . . . *C. laxa*

Cratægus anisophylla n. sp.

A large shrub or a tree sometimes 6^{m} tall with a short trunk 1.5–2^{dm} in diameter, clothed with dark brown, either rough or rimose bark, the drooping branches often armed with gray or chestnut-brown spines 1–2^{cm} long: leaves spatulate or cuneate, the blades 2–4^{cm} long, 5^{mm}–1.5^{cm} wide, or a little broader on the shoots, rounded, pointed or lobed at the apex, wedge-shaped at the base, the margins dentate and lobed above the middle; they are glabrous or nearly so at maturity, and when young are pubescent along the midrib and veins and in their axils, bright green, thin to firm in texture, fading in autumn with tones of yellow, brown and orange: petioles 5^{mm}–3^{cm} long, winged, remotely glandular: flowers about 15^{mm} wide, opening towards the end of March or early in April and when the leaves are about half grown; they

[34] Bot. Gaz. **30**: 341, 1900.
[35] Journ. E. Mitchell Soc. **17**[1]: 10, 1900.
[36] B. B. Studies **1**: 28, 1901.

are solitary or in simple, 2–4-flowered corymbs which terminate short leafy branchlets or fascicles of leaves: pedicels and hypanthium tomentose: sepals 3–4^{mm} long, glandular-serrate, reflexed after anthesis: stamens about 20, the anthers yellow: fruit, which ripens and falls in August, globose or subglobose, 6–8^{mm} in diameter, orange, flushed or cheeked with red when fully ripe, the flesh soft: nutlets 3–5, 4.5–5.5^{mm} long, the lateral surfaces nearly plane: hypostyle about 3^{mm} long.

Cratægus anisophylla grows in sandy soil and on the banks of the St. John's river near Jacksonville, Florida (type locality), and is common on the high sandy banks of the river below the city.

The type specimens, representing flowers (*B4067*) and fruit (*B4067*^{2}) from the same tree, are preserved in the Biltmore Herbarium.

Cratægus frugalis n. sp.

A small tree or large shrub 3–5^{m} tall, the slender trunk or main axis covered with dark, rough bark: branches spreading or drooping, sometimes armed with chestnut-brown or gray spines 1.5–3^{cm} long: leaves cuneate or obovate-cuneate, the blades 1.5–3.5^{cm} long, 7^{mm}–2^{cm} wide, or broader on leading shoots, either rounded or with a short abrupt point at the apex, wedge-shaped or more abruptly contracted at the base, the borders glandular, dentate or nearly entire; they are glabrous or glabrate in age, and when young are more or less pubescent on both surfaces, especially along the midrib and principal veins and in their axils, bright green, firm in texture, fading with tones of yellow, orange and brown: petioles 5^{mm}–2^{cm} long, winged, glandular, pubescent, at least when young: flowers 12–17^{mm} wide, opening about the first of April and when the leaves are about half grown; they are borne in simple, 3–5-flowered corymbs which terminate short leafy branchlets or fascicles of leaves: pedicels and hypanthium tomentose: sepals 3–4^{mm} long, glandular-serrate or nearly entire, reflexed after anthesis; stamens 20, the anthers yellow: fruit, which ripens towards the end of August, subglobose, 7–9^{mm} thick, red at maturity: nutlets 3–5, 5–6^{mm} long, the lateral surfaces nearly plane: hypostyle 3–4^{mm} long.

Cratægus frugalis was originally found April 3, 1901, growing on the banks of the Flint river near Albany, Georgia (type locality).

The type specimens, which are preserved in the Biltmore Herbarium, represent both flowers (*B4092*) and fruit (*B4092*[2]) from the same tree.

Cratægus viaria n. sp.

A large shrub or small tree 2–5[m] tall with a short trunk sometimes 2[dm] in diameter, the branches, which are frequently armed with short spines 1–2[cm] long, drooping at their extremities and forming a wide, spreading top: leaves spatulate, cuneate or obovate-cuneiform, the blades 1.5–3.5[cm] long, 1–2[cm] wide, pointed or lobed at the apex, wedge-shaped or more abruptly contracted at the base, the borders glandular, dentate and usually shallowly lobed above the middle; they are glabrate or pubescent along the midrib and in the axils of the principal veins beneath at maturity, and when young are almost glabrous and shining on the upper surface, paler below and more or less pubescent, thin to firm in texture, fading with tones of yellow, orange and brown: petioles 7[mm]–2[cm] long, winged, glandular, pubescent, at least when young: flowers 10–13[mm] wide, opening towards the end of March; they are solitary or in simple, 2–4-flowered corymbs which terminate short leafy branchlets or fascicles of leaves: pedicels and hypanthium tomentose: sepals 3–4[mm] long, glandular-serrate or nearly entire, reflexed after anthesis: stamens 20, the anthers yellow: fruit, which ripens in August, globose, 7–9[mm] in diameter, red at maturity: nutlets 3–5, 6–7[mm] long, the lateral surfaces nearly plane: hypostyle 4–5[mm] long.

Cratægus viaria is not uncommon in sandy soil in northeastern Florida, especially at Jacksonville (type locality).

The type specimens, which are preserved in the Biltmore Herbarium, represent both fruit (*B4065*[2]) and flowers (*B4065*) from the same tree.

Cratægus cirrata n. sp.

A large shrub or frequently arborescent, 2–6[m] tall, with a slender trunk covered with dark, rough bark, the crooked, drooping branches, which are frequently armed with stout spines 2–3.5[cm] long, forming an irregular, spreading top: leaves spatulate, cuneate or obovate-cuneiform, variously curled and crisped, the blades 1.5–2.5[cm] long, 7[mm]–2[cm] wide, or broader on leading shoots, pointed or lobed at the apex, narrowed or contracted at the base, the borders dentate, glandular, lobed above the middle; they are

coated with white tomentum on both surfaces at the time of unfolding, and when half-grown are bright green, tomentose or pubescent along the lower portion of the midrib and principal veins and in their axils on both surfaces, becoming in age deep green, rather inconspicuously pubescent on both sides, firm to subcoriaceous in texture, fading in autumn with tones of yellow, orange and brown: petioles 5^{mm}–2^{cm} long, tomentose or pubescent, margined, glandular: flowers about 15^{mm} wide, opening early in April and when the leaves are barely half grown; they are produced in simple, 3–5-flowered corymbs which terminate short, leafy branchlets or fascicles of leaves: pedicels and hypanthium tomentose: sepals 4–5^{mm} long, serrate, glandular, reflexed after anthesis: stamens 20, the anthers light yellow: fruit globose or subglobose, 7–9^{mm} in diameter, red at maturity: nutlets 3–5, about 6^{mm} long, the lateral surfaces nearly plane: hypostyle about two-thirds as long as the ventral angle.

Cratægus cirrata, on account of the wavy or crisped leaves, presents a peculiar and striking appearance. The original specimens were gathered on the gravelly hills at Girard, Alabama.

The type material, representing flowers (*B4122*) and fruit (*B4122*^{2}) from the same individual, is preserved in the Biltmore Herbarium.

Cratægus arguta n. sp.

A small tree or large shrub 2–6^{m} tall, sometimes with a short trunk 1.5^{dm} in diameter covered with dark, rough bark, the drooping branches, which are frequently armed with short, stout spines, forming an irregular, spreading crown: leaves cuneate or obovate-cuneiform, the blades 1.5–3^{cm} long, 8^{mm}–2.5^{cm} wide, rounded or abruptly sharp-pointed at the apex, wedge-shaped or more abruptly contracted at the base, the borders dentate, glandular or shallowly lobed, especially above the middle; they are pubescent, at least on the lower surface at maturity, and at the time of unfolding are densely covered with tomentum on both sides, dull green when young, becoming bright green with age, firm to subcoriaceous in texture, fading in autumn with tones of yellow, orange and brown: petioles 5^{mm}–2^{cm} long, winged, glandular, tomentose or pubescent: flowers about 15^{mm} wide, opening early in April and when the leaves are one-half or two-

thirds grown; they are produced in simple, 3–5-flowered corymbs which terminate short leafy branchlets or fascicles of leaves: pedicels and hypanthium tomentose: sepals 4–5^{mm} long, glandular-serrate, reflexed after anthesis: stamens 20, the anthers yellow: fruit, which ripens in September, globose when fully ripe, 7–9^{mm} in diameter, red: nutlets 3–5, about 6^{mm} long, the lateral surfaces nearly plane: hypostyle 4^{mm} long.

Cratægus arguta grows in dry woods and slopes in eastern central Alabama and southwestern Georgia.

The type specimens, representing flowers (*B4123*) and fruit (*B4123*$^{2\&3}$) from the same tree and deposited in the Biltmore Herbarium, were gathered at Girard, Alabama.

Cratægus laxa n. sp.

A small tree or large shrub 3–6^{m} tall, sometimes with a short trunk 2^{dm} in diameter, covered with dark gray or brownish-black rough bark, the spreading and slightly drooping branches forming a wide crown: leaves cuneate or obovate-cuneiform, the blades 1.5–5^{cm} long, 7^{mm}–3^{cm} wide, or broader on leading shoots, either rounded, abruptly pointed or lobed at the apex, narrowed or contracted at the base, the borders dentate, glandular; they are dull green and thickly coated with tomentum at the time of unfolding, becoming bright green and pubescent in age, firm to subcoriaceous in texture, fading with tones of yellow, orange and brown: petioles 7^{mm}–2.5^{cm} long, winged, glandular, pubescent: flowers 14–18^{mm} wide, opening early in April and when the leaves are less than half grown; they are produced in simple, 3–5-flowered corymbs which terminate short leafy branchlets or fascicles of leaves: pedicels and hypanthium tomentose: sepals 3.5–5^{mm} long, serrate, glandular, reflexed after anthesis: stamens 20, the anthers white: fruit, which ripens in September, subglobose or short-oval, 7–9^{mm} thick, 9–11^{mm} long, red at maturity: nutlets 3–5, about 7^{mm} long, the lateral surfaces nearly plane: hypostyle 4–5^{mm} long.

Cratægus laxa grows in dry woods and on ridges in eastern central Alabama, and the original specimens, which represent flowers (*B4117*) and fruit (*B4117*$^{2\&3}$) from the same tree, were collected at Phœnix City.

The type material is preserved in the Biltmore Herbarium

COLONICÆ

Leaves entire or nearly so, gland-margined . . . . . *C. colonica*
Leaves dentate, glands less conspicuous . . . . . *C. vicana*

Cratægus colonica n. sp.

A small tree or large shrub 3–6^{m} tall with a short trunk sometimes 2–3^{dm} in diameter, covered with ashy-gray, rough or rimose bark, the drooping branches frequently armed with chestnut-brown or gray spines 1–3^{cm} long: leaves cuneate or obovate-cuneiform, the blades 1–3^{cm} long, 7^{mm}–3.5^{cm} wide, rounded or abruptly pointed at the apex, narrowed or contracted at the base, the borders glandular, usually dentate or shallowly lobed above the middle; they are glabrate in age, or pubescent on the lower surface, and especially along the midrib and in the axils of the prominent veins, bright or yellow-green, subcoriaceous in texture, fading with tones of yellow, orange and brown: petioles 5^{mm}–2^{cm} long, winged, glandular, pubescent, at least when young: flowers, which open during the last of April or early in May, produced in simple, mostly 2–4-flowered corymbs: pedicels and hypanthium tomentose: sepals 3–4.5^{mm} long, serrate, glandular, reflexed after anthesis: stamens normally 20: fruit, which ripens and falls late in August or early in September, pyriform, 10–13^{mm} thick, 1.5–2^{cm} long, orange-red at maturity, the flesh soft: nutlets 3–5, about 8^{mm} long, the lateral surfaces nearly plane: hypostyle about 5^{mm} long.

Cratægus colonica was apparently first collected by Dr. J. H. Mellichamp on the bluffs of May river, near Bluffton, Beaufort county, South Carolina (type locality), where the species is not uncommon.

The type material is preserved in the Biltmore Herbarium.

Cratægus vicana n. sp.

A large shrub or small tree 2–4^{m} tall with a short trunk sometimes 1.5–2^{dm} in diameter, covered with ashy-gray or brownish, rough or rimose bark, the drooping branches, which are frequently armed with stout spines 1.5–3.5^{cm} long, forming a wide-spreading crown: leaves cuneate or oblong- or obovate-cuneiform, the blades 1.5–3.5^{cm} long, 7^{mm}–2^{cm} wide, or on leading shoots sometimes 4.5^{cm} wide, either pointed or rounded or occasionally truncate at the apex, narrowed or contracted at the base, the mar-

gins dentate or shallowly lobed near the apex; they are glabrate or somewhat pubescent on the lower surface at maturity, and when young are lucid or bright green and slightly pubescent on the upper surface, especially along the midrib, pale beneath, and with conspicuous tufts of tomentum in the axils of the veins, which, together with the midrib, are coated with pale hairs, firm to subcoriaceous in texture, bright green, fading in autumn with tones of yellow, orange and brown: petioles 7mm–2.5cm long, margined, glandular, pubescent, at least when young: flowers 15–20mm wide, opening about the 20th of March and when the leaves are almost fully grown; they are disposed in simple, 3–5-flowered corymbs which terminate leafy branchlets or fascicles of leaves: pedicels and hypanthium tomentose: sepals 4–5mm long, glandular-serrate, reflexed after anthesis: stamens 20, the anthers light yellow: fruit, which ripens in August, pyriform or oblong-pyriform, 10–14mm thick, about 1.5cm long, at maturity yellow or orange, blotched or cheeked with red, the flesh succulent: nutlets mostly 3, 8–10mm long, the lateral surfaces nearly plane: hypostyle 6–7mm long.

Cratægus vicana is well represented in herbaria by the collections made by Mr. A. H. Curtiss (*No. 6617*) from individuals growing in a vacant lot in Tavares, Lake county, Florida. From the specimens gathered by Mr. C. L. Boynton at Tavares, and representing flowers (*B4010*) and fruit (*B4010²*) from the same individual, the description has been drawn.

The type specimens are preserved in the Biltmore Herbarium.

RECURVÆ

Leaf-blades (exclusive of the shoots) less than 2cm wide
- Fruit red . . . . . *C. recurva*
- Fruit yellow, orange or orange-red, cheeked or splotched with red
  - Prevailing leaves abruptly contracted at the base
    - Pomes 8–12mm thick: spines mostly 1–2cm long
      - Leaves conspicuously dentate and glandular . . . . *C. rimosa*
      - Leaf-borders subentire: glands less conspicuous
        - Blades obovate or suborbicular . . . . . *C. inopina*
        - Blades much more elongated . . . . . *C. villaris*
    - Pomes smaller: spines numerous, 1.5–3.5cm long . . . *C. curva*
  - Prevailing leaves with cuneate bases or long, winged petioles
    - Leaves acute, or very sharply pointed, toothed or lobed . *C. resima*
    - Leaves abruptly pointed or obtuse, either toothed, lobed or entire

Mature leaves more than 1cm wide
  Vernal leaves long, conspicuously overreaching the flowers
    Petioles mostly short, never as long as the blades
      Nutlets 6–7mm long . . . . . *C. lassa* Beadle[37]
      Nutlets 7–9mm long . . . . . *C. adusta*
    Petioles mostly elongated, sometimes as long as the blades
      Flowers large: calyx segments 4–5mm long. *C. illudens*
      Flowers and calyx segments very small . *C. versuta*
  Vernal leaves less than 2cm long, the petioles white-woolly . . . . . *C. incana*
Mature leaves less than 1cm wide . . . . . *C. crocea*
Some or all of the leaves (exclusive of the shoots) 2cm wide
  Pubescence of the inflorescence copious but thin . . . . . *C. audens*
  Pubescence of the inflorescence densely white-woolly . . . . *C. meridiana*

Cratægus recurva n. sp.

A shrub or small tree 3–5m tall, sometimes with a short trunk 1.5dm in diameter, clothed with ashy-gray or brownish rough or rimose bark, the slender pendulous branches frequently armed with chestnut-brown or gray spines 5mm–1.5cm long: leaves cuneate or spatulate, or on leading shoots obovate-cuneiform, the blades 1.5–3cm long, 5–15mm wide, or broader on the shoots, wedge-shaped or more abruptly contracted at the base, pointed or rounded at the apex, the margins glandular, dentate or lobed; they are glabrous or glabrate at maturity, and when young are more or less pubescent on both surfaces, firm to subcoriaceous in texture, bright green, fading with tones of yellow, orange and brown: petioles 5–15mm long, margined, glandular, pubescent, at least when young: flowers 12–15mm wide, opening about the 20th of March and when the leaves are about half grown; they are solitary or in simple, 2–4-flowered corymbs which terminate short leafy branchlets or fascicles of leaves: pedicels and hypanthium tomentose: sepals 4–5mm long, glandular-serrate, reflexed after anthesis: stamens about 20, the anthers light yellow: fruit, which ripens in August, pyriform or short-pyriform, 7–9mm thick, red at maturity, the flesh soft: nutlets 3–5, 6–7mm long, the lateral surfaces nearly plane: hypostyle about 5mm long.

[37] B. B. Studies **1**: 29, 1901.

Cratægus recurva grows in sandy soil at Ocala, Florida (type locality).

The original specimens, which are preserved in the Biltmore Herbarium, represent flowers (*B4007*) and fruit (*B4007²*) from the same tree.

Cratægus rimosa n. sp.

A small tree or large shrub 2–4^{m} tall with a short, slender trunk sometimes 1^{dm} in diameter, clothed with dark gray or brownish-black rimose bark, the slender drooping branches frequently armed with stout spines 1–2.5^{cm} long: leaves cuneate, spatulate or oblong-cuneiform, the blades 1–2.5^{cm} long, 7^{mm}–2^{cm} wide or broader on leading shoots, usually abruptly contracted but occasionally wedge-shaped at the base, either rounded, abruptly pointed or lobed at the apex, the borders glandular, dentate above the middle; they are glabrate or pubescent on the lower surface at maturity, and when young are more or less pubescent on both sides, especially along the midrib and principal veins and in their axils, firm in texture, eventually bright green, fading with tones of yellow, orange and brown: petioles 5^{mm}–2^{cm} long, margined, glandular, pubescent, at least when young: flowers 12–15^{mm} wide, opening about the 25th of March and when the leaves are about half grown; they are solitary or in simple, 2-4-flowered corymbs which terminate short leafy branchlets or fascicles of leaves: pedicels and hypanthium tomentose: sepals 3–4^{mm} long, glandular-serrate, reflexed after anthesis: stamens 20, the anthers light yellow: fruit, which ripens in August, short-pyriform, 9–12^{mm} thick, at maturity yellow or orange-yellow flushed or cheeked with red, the flesh soft: nutlets 3–5, 6–7^{mm} long, the lateral surfaces nearly plane: hypostyle 4–5^{mm} long, 1.5–2^{mm} wide on each side of the ventral angle.

Cratægus rimosa is abundant in sandy soil at Citra, Florida (type locality).

The type specimens, consisting of flowers (*B4043*) and fruit (*B4043²*) from the same tree, are preserved in the Biltmore Herbarium.

Cratægus inopina n. sp.

A small tree or large shrub 3–5^{m} tall, sometimes with a short trunk 1–1.5^{dm} in diameter, covered with dark, rough or rimose bark, the slender, crooked and recurved branches, which are often armed with spines 1–2^{cm} long, forming a low spreading crown: leaves obovate-cuneiform, sometimes suborbicular, the blades

1.5–2.5^{cm} long, 1–2^{cm} wide, or larger on leading shoots, usually abruptly contracted but occasionally wedge-shaped at the base, either rounded, pointed or lobed at the apex, the borders entire or denticulate; they are glabrate at maturity or with some pubescence on the lower surface and in the axils of the large veins, and when young are more or less pubescent on both surfaces, eventually bright green, firm to subcoriaceous in texture, fading in autumn with tones of yellow, orange and brown: petioles 5^{mm}–2^{cm} long, margined, glandular, pubescent or scurfy-tomentose: flowers 12–15^{mm} wide, opening about the 20th of March and when the leaves are about half grown; they are solitary or in simple, 2–4-flowered corymbs which terminate short, leafy branchlets or fascicles of leaves: pedicels and hypanthium tomentose: sepals 3–4.5^{mm} long, glandular-serrate, reflexed after anthesis, stamens 20, the anthers light yellow or almost white: fruit, which ripens in August, pyriform, 8–11^{mm} thick, 12–14^{mm} long, at maturity yellow or orange-yellow, sometimes cheeked with red, the flesh soft: nutlets 3–5, 6–7^{mm} long, the lateral surfaces nearly plane: hypostyle 4–5^{mm} long.

Cratægus inopina is common in sandy soil at Ocala, Florida (type locality). The original specimens, representing flowers (*B4001*) and fruit (*B4001*^{2}) from the same tree, are preserved in the Biltmore Herbarium

Cratægus villaris n. sp.

A small tree or large shrub 3–5^{m} tall with one or more stems, sometimes with a short trunk 1–1.5^{dm} in diameter covered with dark, rough or rimose bark, the zigzag drooping branches, which are frequently armed with chestnut-brown or gray spines 1–2^{cm} long, forming an irregular, spreading crown: leaves cuneate or oblong-cuneiform, the blades 1.5–3.5^{cm} long, 5^{mm}–2^{cm} wide, or broader on leading shoots, usually abruptly contracted but occasionally wedge-shaped at the base, rounded or abruptly pointed at the apex, the borders glandular, entire or nearly so; they are glabrous or glabrate at maturity, and when young are more or less pubescent on both surfaces, especially on the lower surface and along the midrib and principal veins and in their axils, bright or yellow-green, firm to subcoriaceous in texture, fading with tones of yellow, orange and brown: petioles 5^{mm}–2^{cm} long, mar-

gined, glandular, pubescent, at least when young: flowers 12–16^{mm} wide, opening about the 25th of March and when the leaves are almost fully grown; they are solitary or in simple, 2–4-flowered corymbs which terminate short leafy branchlets or fascicles of leaves: pedicels and hypanthium tomentose: sepals 3–4^{mm} long, glandular-serrate, reflexed after anthesis: fruit, which ripens and falls in August, pyriform, 8–11^{mm} thick, at maturity yellow or orange-yellow, cheeked or flushed with red, the flesh soft: nutlets mostly 3–4, 6–7^{mm} long, the lateral surfaces nearly plane: hypostyle 4–5^{mm} long.

Cratægus villaris is quite common in sandy soil at Citra, Florida (type locality).

The type specimens, representing flowers (*B4042*) and fruit (*B4042*^{2}) from the same tree, are preserved in the Biltmore Herbarium.

Cratægus curva n. sp.

A shrub or very small tree 2–4^{m} tall, usually with several trunks or stems clothed with dark, rough bark, the crooked drooping branches, which are very freely armed with chestnut-brown or gray spines 1.5–3.5^{cm} long, forming a spreading or wide-spreading crown: leaves obovate or obovate-cuneiform, the blades 1–2^{cm} long, 5^{mm}–2^{cm} wide, rounded or abruptly pointed at the apex, abruptly contracted at the base, the borders subentire or denticulate and shallowly lobed; they are glabrate at maturity or with some conspicuous pubescence along the midrib and in the axils of the prominent veins beneath, and when young are more or less pubescent on both surfaces, eventually bright green, firm to subcoriaceous in texture, fading with tones of yellow, orange and brown: petioles 5–15^{mm} long, margined, glandular, pubescent, at least when young: flowers 12–15^{mm} wide, expanding about the end of March and when the leaves are about one-third grown; they are solitary or in simple, 2–4-flowered corymbs which terminate short, leafy branchlets or fascicles of leaves: pedicels and hypanthium tomentose: sepals 3–4^{mm} long, serrate, glandular, reflexed after anthesis: stamens 20, the anthers light yellow: fruit, which ripens in August, pyriform, 6–9^{mm} thick, at maturity orange-red or orange with red cheeks, the flesh very thin: nutlets usually 3–4, 6–7^{mm} long, the lateral surfaces nearly plane: hypostyle 4–5^{mm} long, 2–2.5^{mm} wide near the top of each lateral surface.

Cratægus curva is common in sandy soil throughout northeastern Florida, and especially in the vicinity of Jacksonville (type locality).

The type material, which is deposited in the Biltmore Herbarium, represents flowers (*B4082*) and fruit (*B4082*^{2}) from the same tree.

Cratægus resima n. sp.

A small tree or large shrub 2–4^m tall, sometimes with a short trunk 1^{dm} in diameter covered with dark, rough bark, the drooping branches, which are frequently armed with stout chestnut-brown or gray spines 1–2.5^{cm} long, forming a spreading or wide-spreading crown: leaves cuneate or spatulate, the blades 1–2.5^{cm} long, 7^{mm}–1.5^{cm} wide, pointed or variously lobed at the apex, wedge-shaped at the base, the borders glandular, dentate or irregularly notched above the middle; they are pubescent or glabrate at maturity and when young are pubescent on both surfaces, especially along the midrib and principal veins and in their axils, eventually bright green, firm to subcoriaceous in texture, fading with tones of yellow, orange and brown: petioles 5^{mm}–2^{cm} long, winged, glandular, pubescent, at least when young: flowers about 12^{mm} wide, expanding about the first of April and when the leaves are one-third to one-half grown; they are produced in simple, 2–5-flowered corymbs which terminate short, leafy branchlets or fascicles of leaves: pedicels and hypanthium tomentose: sepals 3–4^{mm} long, glandular-serrate: stamens 20, the anthers pale yellow: fruit, which ripens and falls in August and early in September, pyriform, 9–11^{mm} thick, at maturity orange-yellow blotched with red, the flesh soft: nutlets mostly 3, about 7^{mm} long, the lateral surfaces nearly plane: hypostyle 4–5^{mm} long, 1.5–2^{mm} wide on each lateral surface.

Cratægus resima grows in open woods and old fields, mostly in sandy soil at Albany, Georgia (type locality).

The original specimens, representing flowers (*B4089*) and fruit (*B4089*^{2}) from the same tree, are preserved in the Biltmore Herbarium.

Cratægus adusta n. sp.

A large shrub or small tree 2–5^m tall with a short trunk 1–1.5^{dm} in diameter, clothed with dark gray or brownish rough bark, the slender drooping branches, which are often armed with gray or chestnut-brown spines 1–2^{cm} long, forming an irregular, spreading

crown: leaves cuneiform, the blades 1.5–3^{cm} long, 7^{mm}–2^{cm} wide, or larger and obovate-cuneiform on the leading shoots, rounded or with a short, abrupt point at the apex, wedge-shaped at the base, the borders glandular, subentire or dentate near the apex; they are glabrate at maturity, and when young are more or less pubescent on both surfaces, especially along the midrib and veins, bright green, firm to subcoriaceous in texture, fading in autumn with tones of yellow, orange and brown: petioles 5–15^{mm} long, margined, glandular, pubescent, at least when young: flowers 14–18^{mm} wide, opening towards the end of March and when the leaves are about half grown; they are solitary or in simple, 2–4-flowered corymbs which terminate short, leafy branchlets or fascicles of leaves: pedicels and hypanthium tomentose: sepals 3–5^{mm} long, glandular-serrate, reflexed after anthesis: stamens 20, the anthers almost white: fruit, which ripens in August, short-pyriform, 9–11^{mm} thick, at maturity orange-red, usually spotted and streaked with red, the flesh soft: nutlets 3–5, about 8^{mm} long, the lateral surfaces nearly plane: hypostyle 5–6^{mm} long.

Cratægus adusta grows in sandy woods at Gainesville, Florida (type locality). The original specimens, which are preserved in the Biltmore Herbarium, represent flowers (*B4059*) and fruit (*B4059*^{2}) from the same tree.

Cratægus illudens n. sp.

A small tree or large shrub 3–6^{m} tall with one or more stems, sometimes with a short trunk 2.5^{dm} in diameter, clothed with ashy-gray or brownish-black rough bark, the slender drooping branches, which are often armed with gray or chestnut-brown spines 1–2^{cm} long, forming a spreading or wide-spreading top: leaves cuneiform, the blades 1.5–3.5^{cm} long, 7^{mm}–2^{cm} wide, or broader on vigorous or leading shoots, either rounded, pointed or lobed at the apex, wedge-shaped at the base, the borders entire or denticulate, glandular, sometimes lobed above the middle, especially on leading shoots; they are glabrous or glabrate at maturity, and when young are more or less pubescent on both surfaces, especially along the midrib and principal veins and in their axils, bright green, firm in texture, fading with tones of yellow, orange and brown: petioles 7^{mm}–3^{cm} long, winged, glandular, pubescent, at least when young: flowers 14–18^{mm} wide, opening towards the

end of March and when the leaves are about half-grown; they are occasionally solitary but mostly in 2–4-flowered corymbs which terminate short, leafy branchlets or fascicles of leaves: pedicels and hypanthium tomentose: sepals 3.5–5^{mm} long, glandular-serrate, reflexed after anthesis: fruit, which ripens and falls in August, pyriform, 8–11^{mm} thick, yellow at maturity, the flesh soft: nutlets mostly 3, about 7^{mm} long, the lateral surfaces nearly plane: hypostyle about 5^{mm} long.

Cratægus illudens is abundant in the region about Citra, Florida (type locality), growing in sandy soil.

The type material, which is deposited in the Biltmore Herbarium, consists of flowers (*B4055*) and fruit (*B4055*^{2}) from the same tree.

Cratægus versuta n. sp.

A shrub or small tree 3–6^{m} tall with one or more stems or trunks sometimes 1–2^{dm} in diameter, covered with dark, rough bark, the drooping branches, which are frequently armed with spines 1–2^{cm} long, forming a spreading, irregular crown: leaves cuneiform, the blades 1–3^{cm} long, 5^{mm}–2^{cm} wide, or broader on leading shoots, either rounded, pointed or lobed at the apex, wedge-shaped at the base, the borders glandular, dentate or lobed above the middle; they are pubescent or tomentose at maturity, at least on the lower surface along the midrib and in the axils of the principal veins, and when young are more or less pubescent on both surfaces, eventually firm in texture, bright green, fading with tones of yellow, orange and brown: petioles 5^{mm}–3^{cm} long, winged, glandular, pubescent: flowers 10–12^{mm} wide, opening early in April and when the leaves are about half grown; they are solitary or in simple, 2–4-flowered corymbs which terminate short, leafy branchlets or fascicles of leaves: pedicels and hypanthium tomentose: sepals 2–3^{mm} long, glandular, reflexed after anthesis: stamens normally 20, the anthers light yellow: fruit, which ripens and falls in August, short-pyriform, 6–9^{mm} thick, at maturity orange- or greenish-yellow with ruddy cheeks: nutlets 3–5, about 6^{mm} long, the lateral surfaces nearly plane: hypostyle 3–4^{mm} long.

Cratægus versuta grows in woods and on banks at Albany, Georgia (type locality).

The original specimens, which are deposited in the Biltmore Herbarium, consist of flowers (*B4091*) and fruit (*B4091²*) from the same tree.

Cratægus incana n. sp.

A large shrub 2–4^{m} tall with one or more stems covered with dark gray or brownish, rough or scaly bark, the crooked, recurved branches sometimes armed with short, gray or chestnut-brown spines: leaves cuneate, or obovate-cuneate, the blades 1–2.5^{cm} long, 7^{mm}–2^{cm} wide, abruptly pointed or rounded at the apex, wedge-shaped or more abruptly contracted at the base, the margins glandular, subentire or shallowly lobed; they are pubescent at maturity, and when young are pubescent on both surfaces, especially along the midrib and principal veins and in their axils, eventually bright green, firm to subcoriaceous in texture, fading with tones of yellow, orange and brown: petioles 5–15^{mm} long, margined, densely white-tomentose when young, glandular: flowers about 15^{mm} wide, opening towards the end of March and when the leaves barely overreach the flowers, they are solitary or in simple, 2–4-flowered corymbs which terminate short, leafy branchlets or fascicles of leaves: pedicels and hypanthium densely white-tomentose: sepals 4–5^{mm} long, glandular, reflexed after anthesis: stamens 20, the anthers nearly white: fruit, which ripens in August, pyriform, 8–9^{mm} thick, at maturity orange-yellow flushed or cheeked with red: nutlets 3–5, about 7^{mm} long, the lateral surfaces nearly plane: hypostyle about 5^{mm} long.

Cratægus incana grows in sandy oak woods at Bristol, Florida (type locality).

The original specimens, representing flowers (*H4020*) and fruit (*H4918*) from the same shrub, are preserved in the Biltmore Herbarium.

Cratægus crocea n. sp.

A small tree or large shrub with one or more stems, 3–6^{m} tall, clothed with dark, rough bark, the slender, drooping branches frequently armed with chestnut-brown or gray spines 1–2.5^{cm} long: leaves cuneiform, the blades 1–2.5^{cm} long, 5–15^{mm} wide, or broader on leading shoots, either pointed or rounded at the apex, wedge-shaped at the base, the borders glandular, denticulate above the middle; they are smooth on the upper surface at maturity,

mostly pubescent beneath, especially along the midrib and largest veins, and when young are more or less pubescent, bright green, firm to subcoriaceous in texture, fading in autumn with tones of yellow, orange and brown: petioles 7mm–2cm long, margined, glandular, pubescent, at least when young: flowers about 15mm wide, expanding towards the end of March and when the leaves are about half-grown; they are solitary or in simple, 2–4-flowered corymbs which terminate short, leafy branchlets or fascicles of leaves: pedicels and hypanthium tomentose: sepals 3–4mm long, glandular-serrate, reflexed after anthesis: stamens 15–20, the anthers nearly white: fruit, which ripens and falls in August, pyriform, 9–12mm thick, at maturity yellow or orange-yellow, rarely cheeked with russet-red, the flesh soft: nutlets 3–5, about 6mm long, the lateral surfaces almost plane: hypostyle 4–5mm long.

Cratægus crocea grows in sandy soil at Citra, Florida (type locality).

The original specimens, which are deposited in the Biltmore Herbarium, consist of flowers (*B4045*) and fruit (*B4045²*) from the same tree.

Cratægus audens n. sp.

A large shrub or small tree 2–5m tall, sometimes with a short trunk 1–1.5dm in diameter, covered with dark gray or brownish, rough or scaly bark, the branches frequently armed with chestnut-brown or gray spines 1.5–2.5cm long: leaves obovate or obovate-cuneiform, the blades 1.5–3.5cm long, 1–3.5cm wide, abruptly pointed, rounded or lobed at the apex, contracted or narrowed at the base, the margins dentate and shallowly lobed; they are glabrate and lustrous on the upper surface at maturity, pubescent beneath, especially along the midrib and principal veins, and when young are more or less pubescent on both surfaces, bright green, eventually firm to subcoriaceous in texture, fading in autumn with tones of yellow, orange and brown: petioles 5–15mm long, margined, glandular, pubescent: flowers 15–16mm wide, opening early in April and when the leaves are two-thirds or more grown; they are borne in simple, 2–5-flowered corymbs, or occasionally solitary: pedicels and hypanthium pubescent: sepals 4–5mm long, glandular-serrate, reflexed after anthesis: stamens 20, the anthers almost white: fruit, which ripens and falls in August, pyriform, 9–12mm thick, at maturity orange-yellow, flushed or

cheeked with red, the flesh soft: nutlets mostly 3, 7–8mm long, the lateral surfaces almost plane: hypostyle 4–5mm long.

Cratægus audens is abundant on dry hills near Chattahoochee, Florida (type locality).

The original specimens, representing flowers (*H4097*) and fruit (*H4963*) from the same tree, are preserved in the Biltmore Herbarium.

Cratægus meridiana n. sp.

A small tree or large shrub 3–7m tall, sometimes with atrunk 2dm in diameter, clothed with dark, rough, or rimose bark, the recurved branches frequently armed with spines 2–3cm long: branchlets slender, zigzag, pubescent when young, becoming glabrous with age, dark reddish-brown, marked with small pale lenticels: buds globular, bright reddish-brown, the outer scales obtuse, the inner pointed: leaves cuneate, obovate-cuneiform, or on vigorous shoots broader than long, the blades 2–3cm long, 7mm–3cm wide, abruptly pointed or lobed at the apex, narrowed or contracted at the base, the borders dentate, glandular, shallowly lobed above the middle; they are glabrate on the upper surface at maturity, more or less pubescent beneath, especially along the midrib and in the axils of the prominent veins, and when young are sparsely coated on both surfaces with pale hairs, bright green, eventually firm to subcoriaceous in texture, fading in autumn with tones of yellow, orange and brown: petioles 7mm–3cm long, winged, glandular, pubescent: flowers 18–20mm wide, opening about the 10th of April and when the leaves are about half grown; they are produced in simple, 3–5-flowered corymbs which terminate short, leafy branchlets: pedicels and hypanthium tomentose: sepals 5–6mm long, glandular, serrate, reflexed after anthesis: stamens 20, the anthers light yellow or nearly white: fruit, which ripens and falls in August or early in September, pyriform, 7–9mm thick, 12–15mm long, at maturity orange-yellow, sometimes flushed or streaked with red, the flesh soft: nutlets 3–5, about 6mm long, the lateral surfaces nearly plane: hypostyle about 4mm long.

Cratægus meridiana grows in sandy oak woods at Ozark, Alabama (type locality).

The original specimens, which are deposited in the Biltmore Herbarium, represent both flowers (*H4114*) and fruit (*H5007*) from the same tree.

LEPIDÆ

Spines less than 3cm long
- Fruit globose at maturity
  - Inflorescence tomentose: leaves abruptly contracted below . . . . . *C. lepida* Beadle [38]
  - Inflorescence glabrous: leaves cuneate or spatulate . . . . . *C. lacrimata* Small [39]
- Fruit pyriform, or nearly so
  - Leaves crenate . . . . . *C. condigna* Beadle [40]
  - Leaves dentate or lobed . . . . . *C. geniculata* Ashe [41]

Spines long and slender
- Fruit globose . . . . . *C. pexa*
- Fruit pyriform, or nearly so
  - Calyx segments 3–4mm long: corymbs few- to several-flowered . . . . . *C. yadkinensis* Ashe [42]
  - Calyx segments 4–6mm long: flowers solitary or in twos and threes
    - Leaves toothed: pedicels and shoots soon becoming glabrous . . . . . *C. munda* Beadle [43]
    - Leaves finely toothed and lobed: pedicels and shoots tomentose . . . . . *C. invicta* Beadle [44]

Cratægus pexa n. sp.

A shrub 1–3m tall with one or more stems, the branches zigzag, very freely armed with chestnut-brown or gray spines 2.5–4cm long: leaves cuneate or spatulate, the blades 1–2cm long, 7–15mm wide, or larger on vigorous shoots and varying from obovate to broadly ovate, frequently broader than long, either rounded, pointed or lobed at the apex, wedge-shaped or more abruptly contracted at the base, the margins dentate or crenate; they are pubescent at maturity, at least on the lower surface, and when young are coated on both surfaces with soft pale hairs, eventually bright green, subcoriaceous in texture, fading with tones of yellow, orange and brown: petioles very short, 1–10mm long, glandular, pubescent: flowers 10–15mm wide, either solitary or in twos and threes, opening towards the end of April and when the leaves are about half grown: pedicels and hypanthium tomentose:

[38] B. B. Studies **1**: 36, 1901.
[39] Torreya **1**: 97, 1901.
[40] B. B. Studies **1**: 35, 1901.
[41] Journ. E. Mitchell Soc. **17**[1]: 16, 1900.
[42] Journ. E. Mitchell Soc. **17**[1]: 17, 1900.
[43] B. B. Studies **1**: 38, 1901.
[44] B. B. Studies **1**: 37, 1901.

sepals about 4mm long, glandular, serrate, reflexed after anthesis: stamens about 20: fruit, which ripens in August and September, globose, 7–9mm in diameter: nutlets 3–5, about 6mm long, the lateral surfaces nearly plane: hypostyle about 4mm long.

Cratægus pexa grows in dry woods and on the ridges of Rowan county, North Carolina, and was originally collected in August, 1895, and on April 28, 1897, near Salisbury (type locality).

The type specimens are preserved in the Biltmore Herbarium.

UNIFLORÆ

Mature fruit globose or nearly so
- Leaves obovate or cuneate, mostly obtuse
  - Fruit yellow, orange or greenish-yellow . . . . . *C. uniflora* Muench[45]
  - Fruit red . . . . . *C. armentalis*
- Leaves oval, ovate or elliptic, mostly acute
  - Leaves frequently lobed or incised: fruit red at maturity . . . . . *C. vailiæ* Britton[46]
  - Leaves (exclusive of the shoots) not lobed: fruit yellow, orange or greenish-yellow . . . . . *C. raleighensis* Ashe[47]

Mature fruit pyriform
- Leaves prevailingly oval, ovate or elliptic . . . . . *C. bisulcata* Ashe[48]
- Leaves prevailingly obovate or cuneate
  - Calyx segments broad and incised . . . . . *C. gregalis*
  - Calyx segments narrow, entire or serrulate . . . *C. earlei* Ashe[49]

Cratægus armentalis n. sp.

A shrub 3dm–1m tall, usually forming small clumps or covering patches of considerable area, the stems and largest branches armed with slender gray or chestnut-brown spines 1–4cm long: leaves cuneate or spatulate, the blades 1–2cm long, 5–15mm wide, either rounded or pointed at the apex, wedge-shaped at the base, the borders serrate, usually only above the middle; they are slightly pubescent at maturity, and when young are coated on both surfaces with pale, soft hairs, especially on the midrib and principal veins on the lower surface, at first gray-green, but soon bright green, firm in texture, fading in autumn with tones of yellow, red and brown: petioles very short, pubescent: flowers

[45] Hausv. **5**: 147, 1770.
[46] Bull. Torr. Bot. Club **24**: 53, 1897.
[47] Bull. N. C. College Agric. and M. A. No. **175**: 112, 1900.
[48] Bull. N. C. College Agric. and M. A. No. **175**: 112, 1900.
[49] Bull. N. C. College Agric. and M. A. No. **175**: 112, 1900.

10–15^{mm} wide, opening about the 10th of May and when the leaves are almost fully grown; they are solitary or in twos and threes and terminate short, leafy branchlets: pedicels and hypanthium densely hirsute-tomentose: sepals narrowly lanceolate, 5–7^{mm} long, serrate, glandular, reflexed after anthesis: stamens 20, the anthers pale yellow or nearly white: fruit, which ripens in October, globose, about 1^{cm} in diameter, red at maturity: nutlets 3–5, about 6^{mm} long, the lateral surfaces nearly plane: hypostyle 4–5^{mm} long.

Cratægus armentalis grows in shallow soil in the rocky glades of Marshall county, Alabama, near Albertville (type locality).

The type specimens (*H4378* and *H3281*) are preserved in the Biltmore Herbarium.

Cratægus gregalis n. sp.

A shrub 1–3^{m} tall, usually with several stems, the branches armed with chestnut-brown or gray spines 2–5^{cm} long: leaves prevailingly obovate or oblong-cuneiform, the blades 1.5–3.5^{cm} long, 7^{mm}–2^{cm} wide, or broader on leading shoots, mostly rounded, but occasionally pointed at the apex, wedge-shaped at the base, the borders crenate or bluntly serrate; they are pubescent and pale on the lower surface at maturity, especially on the midrib and principal veins, bright green and lustrous above, and when young are gray-green and coated with pale, soft hairs, eventually coriaceous in texture, fading in autumn with tones of yellow and brown: petioles very short, pubescent: flowers about 15^{mm} wide, opening about the 20th of May and when the leaves are almost fully grown; they are solitary or in twos and threes and terminate short, leafy branchlets: pedicels and hypanthium densely hirsute-pubescent: sepals 5–6^{mm} long, incised, reflexed after anthesis: fruit, which ripens in October, pyriform, 10–14^{mm} thick, 12–16^{mm} long, at maturity red or ruddy: nutlets 3–5, about 7^{mm} long, the lateral surfaces almost plane: hypostyle about 5^{mm} long.

Cratægus gregalis is common on the sandy flats of the French Broad river near Biltmore, North Carolina (type locality). At least part of the distribution of the Biltmore Herbarium sent out under number 1270^{b}, September 17, 1897, is of this species.

The type material is preserved in the Biltmore Herbarium.

MOLLES

Hypanthium tomentose or pubescent
- Flowers at least 2cm broad: fruit not depressed-globose
  - Anthers yellow
    - Fruit ripening in August–September . . . *C. mollis* (T. & G.) Scheele[50]
    - Fruit ripening in October . . . . . *C. arkansana* Sargent[51]
  - Anthers dark red or purplish . . . . . *C. texana* Buckley[52]
- Flowers about 15mm broad: fruit depressed-globose . . . . . *C. gravida*

Hypanthium glabrous
- Anthers yellow: leaves finely serrate . . . . . *C. cibaria*
- Anthers red or purple: leaves coarsely serrate . *C. lacera* Sargent[53]

Cratægus gravida n. sp.

A wide-spreading tree, sometimes 6–7m tall with a trunk 2–2.5dm in diameter covered with dark brown scaly bark, the branches sometimes armed with stout chestnut-brown or dark gray spines 5–8cm long: leaves broadly ovate, the blades 4–9cm long, 3–8cm wide, mostly acute at the apex, rounded, truncate or cordate at the base, the borders serrate and shallowly incised; they are bright, deep green and glabrous or glabrate and lustrous on the upper surfaces at maturity, pale green and pubescent beneath, and when young are coated with fine, pale hairs on both surfaces, especially and very densely so along the prominent midrib and veins on the lower surface, firm in texture, fading with tones of yellow, orange and brown: petioles 1.5–3cm long, pubescent: flowers about 15mm wide, opening about the first of May and when the leaves are half to two-thirds grown; they are disposed in dense, compact, subsimple or compound, hirsute-tomentose, many-flowered corymbs, the lower branches of which arise from the axils of leaves: pedicels and hypanthium hirsute-tomentose: sepals 3–5mm long, glandular-serrate, reflexed after anthesis: stamens about 20: fruit, which ripens in August and September, depressed-globose, 12–15mm in diameter, red at maturity: nutlets mostly 5, about 8mm long, the lateral surfaces nearly plane: hypostyle 4–5mm long.

[50] Linnea **21**: 569, 1848.
[51] Bot. Gaz. **31**: 223, 1901.
[52] Proc. Phila. Acad. **1861**: 454.
[53] Bot. Gaz. **33**: 123, 1902.

Cratægus gravida grows on the limestone hills near Nashville, Tennessee (type locality), where several remarkably fine large trees have been noticed.

The original specimens (*H2142* and *H2736*) are preserved in the Biltmore Herbarium.

Cratægus cibaria n. sp.

A shrub or small tree 3–6^{m} tall with a trunk sometimes 1.5–2^{dm} in diameter, covered with dark gray, scaly bark, the branches frequently armed with spines 2.5–4^{cm} long: leaves ovate, broadly ovate or oval, the blades 3–9^{cm} long, 2–7^{cm} wide, acute or acuminate at the apex, rounded or contracted at the base, the margins sharply serrate and incised; they are glabrous on the upper surface at maturity, pubescent along the midrib and bases of the principal veins beneath and in their axils, and when young are bright green and very sparsely pubescent on the upper surface, paler beneath and pubescent along the midrib and veins, or on their bases and in the axils, thin to firm in texture, fading in autumn with tones of yellow and brown: petioles 1–4^{cm} long, pubescent: flowers, which open about the last of April and when the leaves are about two-thirds grown, produced in ample, many-flowered, sparingly-pubescent corymbs, the lower branches of which arise from the axils of leaves: pedicels pubescent: hypanthium glabrous: sepals 5–6^{mm} long, incised, glandular, reflexed after anthesis: stamens 20, the anthers light yellow: fruit, which ripens from the middle to the end of August, short-oblong or obovate, 10–14^{mm} wide, 12–15^{mm} long, red at maturity, the flesh soft and edible: nutlets 3–5, about 8^{mm} long, 4–5^{mm} measured dorso-ventrally, the lateral surfaces nearly plane: hypostyle about 5^{mm} long.

Cratægus cibaria is common on the hills near Nashville, Tennessee (type locality).

The original specimens, representing flowers (*H2131*) and fruit (*H2721* and *H1270*) from the same tree, are preserved in the Biltmore Herbarium.

BILTMOREANÆ

Stamens normally 10: fruit yellow or orange, often cheeked red . . . . . *C. biltmoreana* Beadle[54]

Stamens normally 20: fruit red or ruddy . . . . . *C. craytoni*

[54] Bot. Gaz. **28**: 406, 1899.

Cratægus craytoni n. sp.

A shrub 1–2^{m} tall with one or more stems clothed with dark gray or brownish, scaly bark, the branches sometimes armed with dark gray or chestnut-brown spines 3–5^{cm} long: leaves ovate, oblong-ovate or oval, the blades 3–7^{cm} long, 2–5 ^{cm} broad, acute at the apex, rounded or contracted at the base, the borders serrate and incised; they are dark green and finely but rather inconspicuously pubescent on the upper surface at maturity, paler beneath, pubescent, especially along the midrib and principal veins, and when young are clothed with pale, short hairs on both surfaces, thin to firm in texture, fading in autumn with tones of yellow, orange and brown: petioles 1–2.5^{cm} long, margined, glandular, pubescent: flowers about 2^{cm} wide, expanding about the 20th of May and when the leaves are almost fully grown; they are disposed in simple, 3–7-flowered corymbs which terminate short, leafy branchlets of the present season's growth: pedicels and hypanthium pubescent: sepals 4–5^{mm} long, glandular-serrate, reflexed after anthesis: stamens 20, the anthers light yellow: fruit, which ripens and falls in September, oblong or obovate, 9–12^{mm} thick, 10–14^{mm} long, at maturity red or ruddy: nutlets 3–5, about 8^{mm} long, the lateral surfaces nearly plane: hypostyle 3–4^{mm} long.

Cratægus craytoni grows on the bluffs and banks of the French Broad river, three miles south of Marshall, Madison county, North Carolina (type locality), where it was first found and collected by Mr. F. M. Crayton, of Biltmore, N. C., and for whom the species is named.

The type specimens, representing both flowers and fruit from the same bush, are preserved in the Biltmore Herbarium.

PRUINOSÆ

Fruit globose, subglobose or oval
- Stamens normally 20
  - Pomes angled, conspicuously swollen below the middle
    - Anthers white or light yellow . . . . . *C. rustica*
    - Anthers purple or purplish . . . . . *C. arcana*
  - Pomes not conspicuously angled or swollen below the middle
    - Anthers purple or purplish . . . . . *C. georgiana* Sargent[55]
    - Anthers white or pale yellow . . . . . *C. callida*
- Stamens 10 . . . . . *C. iracunda*

Fruit pyriform . . . . . *C. vicinalis*

[55] Bot. Gaz. **33**: 113, 1902.

Cratægus rustica n. sp.

A large shrub or small tree 2–6^{m} tall, sometimes with a trunk 2^{dm} in diameter, clothed with dark gray or brownish-black scaly bark, the spreading and ascending branches frequently armed with stout, chestnut-brown or gray spines 2–5.5^{cm} long: leaves ovate or oval, the blades 2–5^{cm} long, 1.5–5^{cm} wide, acute at the apex, rounded, narrowed or on leading shoots truncate or cordate at the base, the borders serrate and incisely lobed; they are glabrous when fully grown and when young are glabrous except a small area at the base of the blade, which bears a few pale hairs, bright green, thin to firm in texture, fading in autumn with tones of yellow, orange and brown: petioles 1.5–3^{cm} long, glabrous: flowers 15–18^{mm} wide, opening about the 10th of May and when the leaves are two-thirds grown; they are produced in simple, 3–9-flowered corymbs which terminate short, leafy branchlets: pedicels and hypanthium glabrous: sepals 3–4^{mm} long, mostly entire, reflexed after anthesis: stamens 20, the anthers light yellow: fruit, which ripens late in September and in October, subglobose, 7–11^{mm} thick, obtusely angled and conspicuously swollen below the middle, dull red at maturity, or red and green, the flesh firm: nutlets 3–5, about 7^{mm} long, the lateral surfaces nearly plane: hypostyle about 4^{mm} long.

Cratægus rustica is common in old fields and woodlands near Biltmore, North Carolina (type locality).

The type specimens, which are deposited in the Biltmore Herbarium, represent both flowers and fruit from the same tree.

Cratægus arcana n. sp.

A shrub or small tree 2–6^{m} tall with a short trunk sometimes 2^{dm} in diameter, clothed with dark gray or brownish-black scaly bark, the spreading and ascending branches often armed with stout chestnut-brown or gray spines 3–5^{cm} long: leaves ovate or oval, the blades 2.5–6^{cm} long, 2–7^{cm} wide, acute or acuminate at the apex, rounded or contracted, or on leading shoots truncate or subcordate at the base, the borders sharply serrate and incised; they are glabrous when fully grown, and when young are sometimes a little pubescent along the base of the midvein, especially on the lower surface, bright green, thin to firm in texture, fading

in autumn with tones of yellow, orange and brown: petioles 1–3^{cm} long, glabrous: flowers 16–20^{mm} wide, opening about the 10th of May and when the leaves are almost fully grown; they are produced in simple or subsimple, 4–10-flowered corymbs which terminate short, leafy branchlets: pedicels and hypanthium glabrous: sepals 4–5^{mm} long, entire or serrulate, reflexed after anthesis: stamens normally 20, the anthers light purple: fruit, which ripens in September and October, subglobose, 8–12^{mm} thick, obtusely angled and conspicuously swollen below the middle, at maturity red or ruddy, the flesh firm: nutlets 3–5, 6–7^{mm} long, the lateral surfaces almost plane: hypostyle about half the length of the ventral angle.

Cratægus arcana grows in woods and old fields near Biltmore, North Carolina (type locality).

The type material, representing flowers and fruit from the same tree, is preserved in the Biltmore Herbarium.

Cratægus callida n. sp.

A shrub or small tree 2–5^{m} tall with one or more stems, sometimes with a short trunk 1.5–2^{dm} in diameter, covered with dark gray or brownish scaly bark, the spreading and ascending branches frequently armed with stout, chestnut-brown or gray spines 2–5^{cm} long: leaves ovate, 2–7^{cm} long exclusive of the petioles, 2–6^{cm} wide, acute or acuminate at the apex, rounded, truncate or subcordate at the base, the borders serrate and with several pairs of short, point-like lobes; they are glabrous at maturity, and when young usually bear some slight pubescence at the base of the blade on the upper surface and along the base of the midrib or in the axils of the prominent veins beneath, bright green, firm in texture, fading in autumn with tones of yellow, red and brown: petioles 1–3^{cm} long, glabrous: flowers about 2^{cm} wide, expanding about the 25th of April and when the leaves are half to two-thirds grown; they are disposed in subsimple or compound, 5–10-flowered corymbs, the lower branches of which arise from the axils of leaves: pedicels and hypanthium glabrous: sepals 3–5^{mm} long, mostly entire, reflexed after anthesis: stamens 20, the anthers very pale yellow or almost white: fruit, which ripens in September and October, depressed-globose, 8–10^{mm} wide, at

maturity red, or green and red and often with russet surfaces, the flesh firm: nutlets 3–5, about 7mm long, the lateral surfaces nearly plane: hypostyle occupying about two-thirds of the ventral angle.

Cratægus callida grows in the flat woods south of Gadsden, Alabama (type locality).

The original specimens, which are deposited in the Biltmore Herbarium, represent both flowers (*B4205*) and fruit (*B1273*) from the same tree.

Cratægus iracunda n. sp.

A large shrub or a slender tree 2–5m tall, sometimes with a trunk 1dm in diameter covered with ashy-gray, either smooth or scaly bark, the ascending or rarely spreading branches freely armed with very stout, chestnut-brown or gray, mostly curved spines, or the latter on the trunk or stems very numerous and compound: leaves ovate or deltoid, the blades 1.5–6cm long, 1–6cm wide, acute or acuminate at the apex, truncate, cordate or occasionally broadly cuneate at the base, the borders sharply serrate and incised; they are bright green and scabrous on the upper surface, pale and glabrous beneath, and when young are pubescent on the upper surface, smooth on the lower, firm in texture, fading with tones of yellow, red and brown: petioles 7mm–2cm long, glabrous, glandular: flowers about 15mm wide, opening about the 20th of April and when the leaves are about one-third grown; they are disposed in simple, 3–7-flowered corymbs which terminate short, leafy shoots: pedicels and hypanthium glabrous: sepals 3–4mm long, entire or glandular-serrate, reflexed after anthesis: stamens 10, the anthers purple: fruit, which ripens and falls in September, subglobose, 8–10mm thick, at maturity red or red and green, the flesh firm: nutlets 3–5, about 6mm long, the lateral surfaces nearly plane: hypostyle 3–4mm long.

Cratægus iracunda is not uncommon in the flat woods near Rome, Georgia (type locality).

Type specimens, representing flowers (*B4171*) and fruit (*B4171*^{2}) from the same tree, are preserved in the Biltmore Herbarium.

Cratægus vicinalis n. sp.

A large shrub or small tree 3–6m tall with a trunk sometimes 1dm in diameter, clothed with dark gray or brownish scaly bark,

the ascending or slightly spreading branches frequently armed with stout, chestnut-brown or gray spines 2–4^{cm} long: leaves ovate, 2–5^{cm} long exclusive of the petioles, 1.5–4^{cm} wide, acute or acuminate at the apex, either rounded, truncate or cordate, or sometimes broadly cuneate at the base, the margins serrate and with short, acute lobes; they are glabrous when fully grown, and at the time of unfolding often bear a few pale hairs near the base of the blades on the upper surface, firm in texture, deep but bright green, fading in autumn with tones of yellow, orange and brown: petioles 7^{mm}–2^{cm} long, glabrous: flowers, which open about the first of May and when the leaves are about two-thirds grown, 14–16^{mm} wide, disposed in simple, 3–7-flowered corymbs: pedicels and hypanthium glabrous: sepals 2–4^{mm} long, entire or serrate, reflexed after anthesis: stamens 20, the anthers white or cream-color: fruit, which ripens in October, pyriform, 7–9^{mm} thick, 9–12^{mm} long, at maturity red or ruddy, the flesh firm: nutlets 3–5, 6.5–7.5^{mm} long, the lateral surfaces nearly plane: hypostyle about 5^{mm} long.

Cratægus vicinalis grows in woods and on slopes from southeastern Tennessee to northwestern Georgia.

The type specimens, which are deposited in the Biltmore Herbarium, were collected at Chattanooga, Tennessee, and represent both flowers (*B4240*) and fruit (*B4240*$^{2\&3}$) from the same tree.

TENUIFOLIÆ

Pomes 10–18^{mm} thick at maturity, subglobose, oblong or oval
- Stamens normally 20 . . . . . *C. basilica*
- Stamens normally 10 . . . . . *C. macrosperma* Ashe[56]

Pomes 6–8^{mm} thick at maturity, subglobose or oval
- Stamens normally 20 . . . . . *C. nubicola*
- Stamens fewer . . . . . *C. roanensis* Ashe[57]

Cratægus basilica n. sp.

A shrub or small tree 4–7^{m} tall, sometimes with a trunk 1–2^{dm} in diameter, covered with dark gray or brownish scaly bark, the ascending or slightly spreading branches frequently armed with stout chestnut-brown or gray spines 2–6^{cm} long: leaves ovate,

[56] Journ. E. Mitchell Soc. **16**^{2}: 73, 1900.
[57] Bull. N. C. College Agric. and M. A. No. **175**: 114, 1900.

3–7^{cm} long exclusive of the petioles, 2.5–6.5^{cm} wide, acute or acuminate at the apex, broadly cuneate, rounded or truncate at the base, the borders serrate and with several pairs of short, acute lobes; they are glabrous when fully grown, and when young are sparsely covered on the upper surface with short, pale hairs, bright green, firm in texture, fading in autumn with tones of yellow, orange and brown: petioles 1–3^{cm} long, glabrous: flowers, which open early in May and when the leaves are about two-thirds grown, 14–17^{mm} wide, produced in subsimple or compound, glabrous, 5–15-flowered corymbs, the lower branches of which are axillary: pedicels and hypanthium glabrous: sepals 4–5^{mm} long, entire or serrate, reflexed after anthesis: stamens 15–20, the anthers purple: fruit, which ripens early in September, subglobose, 12–15^{mm} thick, at maturity red or pruinose-red, the flesh soft, edible: nutlets 3–5, 7–8^{mm} long, the lateral surfaces nearly plane: hypostyle about 5^{mm} long.

Cratægus basilica grows in woods and clearings and on slopes in the mountains of western North Carolina.

The type specimens, which are deposited in the Biltmore Herbarium, were collected near Candler, in Buncombe county, and represent both flowers and fruit from the same tree.

Cratægus nubicola n. sp.

A shrub 1–3^{m} tall with ashy-gray, scaly bark, the ascending or somewhat spreading branches forming a compact, usually symmetrical outline: leaves ovate, 2–5^{cm} long exclusive of the petioles, 2–5^{cm} wide, acute at the apex, rounded or truncate at the base, the borders sharply serrate and with 3–5 pairs of short, acute lobes; they are glabrous at maturity, bright green, firm in texture, fading with tones of yellow and brown: petioles 1–2.5^{cm} long, glabrous: flowers produced in subsimple or compound, 5–10-flowered glabrous corymbs, the lower branches of which arise from the axils of leaves: pedicels and hypanthium glabrous: sepals 4–5^{mm} long, entire or slightly serrate, reflexed after anthesis: stamens normally 20: fruit, which ripens in September, subglobose, 7–9^{mm} thick, red at maturity: nutlets 3–5, 6–7^{mm} long, the lateral surfaces nearly plane: hypostyle 5–6^{mm} long.

Crataegus nubicola inhabits the tops of the high mountains of western North Carolina at elevations above 1,750^{m}.

The original specimens, which are deposited in the Biltmore Herbarium, were collected near the summit of Mt. Pisgah.

BERBERIFOLIÆ

Fruit globose or very nearly so
- Stamens 15–20
  - Mature fruit 1^{cm} or more in diameter
    - Ripe fruit yellow, orange, orange-red or green, often with red cheeks
      - Corymbs and shoots densely hirsute or pubescent . . . . . *C. berberifolia* T. & G.[58]
      - Corymbs and shoots finely pubescent . . *C. edita* Sargent[59]
    - Ripe fruit red or scarlet . . . . . *C. fera*
  - Mature fruit smaller
    - Anthers yellow or nearly white
      - Pedicels and branches of the corymbs long and flexuous . . . . . *C. mohri* Beadle[60]
      - Pedicels short, the corymbs congested . . *C. edura*
    - Anthers purple or purplish . . . . . *C. tersa*
- Stamens fewer
  - Mature fruit 1^{cm} or more in diameter
    - Corymbs and shoots densely hirsute or pubescent . . . . . *C. tetrica* Beadle[61]
    - Corymbs sparsely pubescent: shoots glabrous or nearly so . . . . . *C. arta*
  - Mature fruit smaller
    - Nutlets 1–3 . . . . . *C. torva*
    - Nutlets 3–5 . . . . . *C. denaria*

Fruit oval or oblong
- Stamens normally 20 . . . . . *C. crocina*
- Stamens fewer
  - Mature fruit yellow, orange or orange-red, often with red cheeks
    - Spines few or wanting: fruit succulent, pale yellow . . . . . *C. albicera*
    - Spines numerous: fruit hard, ruddy on the cheeks . . . . . *C. sinistra* Beadle[62]
  - Mature fruit red . . . . . *C. signata* Beadle[63]

[58] Flora N. Am. **1**: 469, 1838.
[59] Bot. Gaz. **33**: 110, 1902.
[60] Bot. Gaz. **28**: 416, 1899.
[61] B. B. Studies **1**: 46, 1901.
[62] B. B. Studies **1**: 44, 1901.
[63] B. B. Studies **1**: 42, 1901.

Cratægus fera n. sp.

A tree 5–7^{m} tall with a trunk sometimes 2^{dm} in diameter, covered with dark gray or brownish scaly bark, the spreading branches often armed with chestnut-brown or gray spines 2–3^{cm} long: leaves oblong- or obovate-cuneiform, the blades 2.5–5^{cm} long, 1.5–3^{cm} wide, rounded or obtuse or rarely nearly truncate at the apex, gradually narrowed or sometimes contracted at the base, the borders serrate above the middle; they are dark green, lustrous and slightly scabrous on the upper surface at maturity, pale or whitened beneath and with some persistent pubescence, especially along the midrib, and when young are sparsely coated on both surfaces with short, pale hairs, eventually firm to subcoriaceous in texture, fading in autumn with tones of yellow, orange and brown: petioles 5–15^{mm} long, margined, pubescent, at least when young: flowers 12–15^{mm} in diameter, opening about the middle of April and when the leaves are almost fully grown; they are produced in pilose-pubescent, compound, ample corymbs, the lower branches of which are axillary: pedicels and hypanthium pilose-pubescent, or the latter pubescent only at the base: sepals 3–4.5^{mm} long, entire or serrate, reflexed or spreading after anthesis: stamens 16–20, the anthers yellow or cream-color: fruit globose or subglobose, about 1^{cm} wide, ripening and falling in September and October, at maturity bright red or scarlet: nutlets mostly 2–3, about 6^{mm} long, the lateral surfaces nearly plane: hypostyle about 4^{mm} long.

Cratægus fera grows in low woods of oak and hickory in southern Louisiana. The type specimens, which are preserved in the Biltmore Herbarium and consist of flowers (*H4150*) and fruit (*H5132*) from the same tree, were collected seven miles west of Opelousas.

Cratægus edura n. sp.

A tree sometimes 7–8^{m} tall with a trunk 2^{dm} in diameter covered with ashy-gray or brownish, scaly bark, the branches sometimes armed with chestnut-brown or gray spines 3–5^{cm} long: leaves cuneate or oblong- or obovate-cuneiform, the blades 2.5–6^{cm} long, 1–3^{cm} wide, mostly rounded or obtuse, but occasionally acute at the apex, cuneate at the base, the borders serrate or crenate-serrate above the middle; they are glabrate or somewhat

scabrous on the upper surface at maturity, usually with some pubescence along the midrib beneath, and when young are sparingly pubescent on both surfaces, lustrous above, pale below, eventually firm or subcoriaceous in texture, fading with tones of yellow, orange and brown: petioles 2–10^{mm} long, pubescent, at least when young: flowers 10–14^{mm} wide, opening about the 10th of April and when the leaves are almost fully grown; they are produced in small, congested, compound, 5–12-flowered corymbs which terminate short, leafy branchlets: pedicels sparingly pilose: hypanthium glabrous or with a few hairs at the base: sepals 3–4.5^{mm} long, entire or slightly serrate: stamens 16–20, the anthers light yellow or almost white: fruit, which ripens and falls in September, subglobose, 8–9^{mm} thick, at maturity orange-yellow with red or ruddy cheeks: nutlets mostly 2–3, 6–7^{mm} long, the lateral surfaces nearly plane: hypostyle about two-thirds the length of the nutlet.

Cratægus edura grows in upland woods near Opelousas, Louisiana (type locality).

The type material, consisting of flowers (*H4138*) and fruit (*H4138*^{2}) from the same tree, is preserved in the Biltmore Herbarium.

Cratægus tersa n. sp.

A tree 4–6^{m} tall with a trunk sometimes 1.5–2^{dm} in diameter clothed with dark gray or brownish scaly bark, the spreading branches forming a wide crown: leaves oblong- or obovate-cuneiform, the blades 2–6^{cm} long, 1–4.5^{cm} wide, rounded or obtuse, or on leading shoots slightly pointed at the apex, wedge-shaped or more abruptly contracted at the base, the borders serrate or crenate-serrate above the middle; they are lustrous and glabrous or slightly scabrous on the upper surface at maturity, more or less pubescent beneath, and when young are sparsely pubescent on the upper surface, and below are coated with pale hairs, especially and densely so along the midrib, bright green, eventually subcoriaceous in texture, fading with tones of yellow, orange and brown: petioles 5–15^{mm} long, margined, pubescent, at least when young: flowers, which open about the middle of April and when the leaves are almost fully grown, 15–18^{mm} wide, produced in compound, many-flowered, pilose-pubescent corymbs: pedicels

and hypanthium pilose-pubescent: stamens 18–20, the anthers purplish: fruit subglobose, 8–9^{mm} thick, ripening in October, ruddy at maturity: nutlets mostly 2–3, about 6^{mm} long, the lateral surfaces nearly plane: hypostyle about 4^{mm} long.

Cratægus tersa grows in upland woods near Opelousas, Louisiana (type locality).

The original specimens, representing flowers (*H4142*) and fruit (*H5124*) from the same tree, are preserved in the Biltmore Herbarium.

Cratægus arta n. sp.

A large shrub or small tree 3–4^{m} tall, the trunk or main stems clothed with dark gray or brownish scaly bark: branches spreading or ascending, freely armed with chestnut-brown or gray spines 2.5–5^{cm} long: leaves cuneate, obovate- or oblong-cuneiform, rarely elliptic, the blades 2–4^{cm} long, 1–2^{cm} wide, or larger on leading shoots, rounded or pointed at the apex, wedge-shaped or more abruptly contracted at the base, the borders serrate above the middle; they are glabrous or with a few hairs along the midrib, especially on the upper surface, firm to subcoriaceous in texture, bright green and lustrous above, pale beneath, fading with tones of yellow, orange and brown: petioles 2–10^{mm} long, sparingly pubescent when young, mainly on the upper surface and margins: flowers, which open about the first of May, about 15^{mm} wide, borne in narrow, close, 4–8-flowered corymbs: pedicels 4–10^{mm} long, more or less pubescent: hypanthium glabrous or with a few hairs near the base: stamens normally 10, the anthers purplish: fruit subglobose or short-ovoid, about 1^{cm} thick, ripening early in October, at maturity yellow-green or orange with red cheeks: nutlets mostly 2–3, 7–8^{mm} long, the lateral surfcaes nearly plane: hypostyle 4–5^{mm} long.

Cratægus arta grows on the limestone hills of middle Tennessee, and was originally collected near Nashville.

The type specimens, consisting of flowers (*H2156*) and fruit (*H3244*) from the same individual, are preserved in the Biltmore Herbarium.

Cratægus torva n. sp.

A large shrub or small tree 3–4^{m} tall with dark gray or brownish scaly bark, the spreading or ascending branches freely armed with chestnut-brown or gray spines sometimes 8^{cm} long: leaves

obovate, elliptic or cuneiform, or on leading shoots sometimes oval, the blades 2–5^{cm} long, 1–3^{cm} wide, or larger on the shoots, either pointed or rounded at the apex, wedge-shaped or more abruptly contracted at the base, the borders serrate above the middle; they are glabrous or glabrate at maturity and when young are slightly pubescent on both surfaces, bright green and lustrous, either smooth or slightly scabrous in age on the upper surface, paler beneath, eventually subcoriaceous in texture, fading with tones of yellow, orange and brown: petioles 2–10^{mm} long, margined, pubescent, at least when young: flowers, which open early in May, about 15^{mm} wide, borne in compound, many-flowered, more or less pilose-pubescent corymbs: pedicels and hypanthium pilose or glabrate: sepals 3–4^{mm} long, entire or sparingly serrate, reflexed or spreading after anthesis: stamens 7–10, the anthers purplish: fruit subglobose, 7–9^{mm} in diameter: nutlets mostly 2–3, 6–7^{mm} long, the lateral surfaces nearly plane: hypostyle about two-thirds as long as the ventral angle.

Cratægus torva grows in woods and on hills in Alabama and Georgia, and is rather common near Birmingham, Alabama (type locality).

The type specimens, representing both flowers (*B2279*) and fruit (*B818*), are deposited in the Biltmore Herbarium.

Cratægus denaria n. sp.

A tree 5–7^{m} tall with a trunk sometimes 2^{dm} in diameter, covered with dark gray or brownish scaly bark, the spreading branches, which are often armed with stout spines 2–3.5^{cm} long, forming a wide crown: leaves oval, oblong-obovate or elliptic, or on leading shoots broadly oval, ovate or obovate, the blades 2.5–6^{cm} long, 1–4^{cm} wide, mostly pointed at the apex, contracted or narrowed at the base, the borders serrate; they are glabrous at maturity and when young bear a few pale weak hairs along the base of the midrib on the upper surface, firm to subcoriaceous in texture, bright green and lustrous above, pale beneath, fading with tones of yellow, orange and brown: petioles 5^{mm}–2^{cm} long, margined, glabrous or with a few hairs on the upper side, especially when young: flowers 13–16^{mm} wide, opening towards the end of April and when the leaves are almost or quite grown; they are produced in compound, many-flowered, more or less pilose corymbs, the lower branches of which are axillary: pedicels and

hypanthium sparingly pilose or glabrous: sepals 4–6^{mm} long, entire or slightly serrate, reflexed or spreading after anthesis: stamens normally 10: fruit globose or subglobose, 6–9^{mm} thick, the flesh thin and firm: nutlets 3–5, 5–6^{mm} long, the lateral surfaces nearly plane: hypostyle about 4^{mm} long.

Cratægus denaria grows on or near the banks of streams in eastern Mississippi and is not uncommon at Columbus (type locality).

The original specimens, consisting of flowers (*H88*) and fruit (*H3196*), are preserved in the Biltmore Herbarium.

Cratægus crocina n. sp.

A tree 4–6^{m} tall with a short trunk sometimes 1–1.5^{dm} in diameter, covered with ashy-gray or brownish-black scaly bark, the spreading branches forming a wide crown: leaves oblong- or obovate-cuneiform, the blades 2–5.5^{cm} long, 1–3^{cm} wide, either rounded or pointed at the apex, cuneate at the base, the borders serrate, except near the base; they are bright green and glabrous or glabrate on the upper surface at maturity, pale or whitened and pubescent beneath, especially along the midrib and principal veins, and when young are more or less pubescent on both surfaces, firm to subcoriaceous in texture, fading in autumn with tones of yellow, orange and brown: petioles 5–15^{mm} long, margined, pubescent, at least when young: flowers 12–16^{mm} wide, opening about the 20th of April and when the leaves are almost or quite fully grown; they are produced in subsimple or compound, few- to many-flowered corymbs, the lowest branches of which are axillary: pedicels and hypanthium pilose-pubescent: sepals 3.5–5^{mm} long, entire or slightly serrate, spreading or reflexed after anthesis: stamens normally 20, the anthers yellow: fruit, which ripens in October, oval or oblong, 8–11^{mm} thick, yellow at maturity: nutlets usually 2, about 7^{mm} long, the ventral surface nearly plane: hypostyle 4–5^{mm} long.

Cratægus crocina is common in low woods seven miles west of Opelousas, Louisiana (type locality), growing with oaks, hickories, gums and dogwoods.

The type specimens, which are deposited in the Biltmore Herbarium, represent both flowers (*H4152*) and fruit (*H5133*) from the same tree.

Cratægus albicera n. sp.

A tree sometimes 7–8^{m} tall with a trunk 2^{dm} in diameter, clothed with dark gray or brownish scaly bark, the spreading

branches forming a wide, symmetrical crown: leaves oval, elliptic or oblong, sometimes obovate or oblong-cuneiform, the blades 2–6^{cm} long, 1–4^{cm} wide, mostly pointed at the apex, contracted or narrowed at the base, the borders serrate, mostly above the middle; they are dark green, lustrous and glabrate on the upper surface at maturity, pale or whitened and pubescent beneath, the pubescence dense and more persistent along the midrib and principal veins, and when young are pubescent on both surfaces, eventually firm to subcoriaceous in texture, fading in autumn with tones of yellow, orange and brown: petioles 2–10^{mm} long, pubescent: flowers, which open early in April and when the leaves are two-thirds or more grown, produced in hirsute-pubescent, compound corymbs: pedicels and hypanthium hirsute-pubescent: sepals 3–4^{mm} long, slightly serrate or entire, spreading or reflexed after anthesis: stamens 10–14, the anthers purple: fruit, which ripens in August, oblong, 8–12^{mm} thick, 10–14^{mm} long, pale yellow at maturity, the flesh soft and edible: nutlets solitary or in pairs, about 7^{mm} long, the ventral surface nearly plane: hypostyle about 4^{mm} long.

Cratægus albicera often forms a fine symmetrical tree, and is common in the region about Opelousas, Louisiana (type locality).

The type material is preserved in the Biltmore Herbarium.

CRUS-GALLI

Stamens 7–12
- Fruit subglobose or oval
  - Anthers rose-color or purplish
    - Inflorescence in ample, spreading corymbs: fruit 8–13^{mm} broad . . . . . *C. crus-galli* L.[64]
    - Inflorescence in small, short corymbs: fruit 5–8^{mm} broad . . . . . *C. macra*
  - Anthers yellow or nearly white
    - Leaves oval, broadly oval or elliptic . . . . . *C. regalis*
    - Leaves obovate or cuneiform . . . . . *C. algens*
- Fruit globose, 5–8^{mm} in diameter
  - Ripe fruit bright, shining red: spines slender, 1–4^{cm} long. *C. pyracanthoides*
  - Ripe fruit pruinose, dull red: spines stout, 3–5^{cm} long . *C. armata*

Stamens more numerous
- Anthers light yellow . . . . . *C. arborea*
- Anthers bright rose-color . . . . . *C. bushi* Sarg.[65]

[64] Sp. Pl. 476, 1753.

[65] Bot. Gaz. **33**: 109, 1902.

Cratægus macra n. sp.

A small tree with a low, flat, spreading top, or a large, spreading shrub 2–5^{m} tall with one or more stems covered with dark gray or brownish scaly bark, the branches freely armed with stout, chestnut-brown or gray spines 2.5–5.5^{cm} long, or on the largest branches and stems the thorns are usually compound and sometimes 1–1.5^{dm} long: leaves cuneate or oblong- or obovate-cuneiform, the blades 2–5^{cm} long, 8^{mm}–2^{cm} wide, either rounded or pointed at the apex, cuneate at the base, the borders serrate above the middle; they are glabrous and lustrous on the upper surface, pale beneath, firm to subcoriaceous in texture, fading in autumn with tones of yellow, orange and brown: petioles 3–10^{mm} long, margined: flowers about 12^{mm} wide, opening about the first of May and when the leaves are two-thirds grown; they are produced in small, short, compound, glabrous corymbs, the lowest branches of which are axillary: pedicels and hypanthium glabrous: sepals 3–4.5^{mm} long, mostly entire, spreading or reflexed after anthesis: stamens about 10, the anthers purplish: fruit, which ripens in September and October, subglobose or oval, 5–8^{mm} broad, red at maturity: nutlets 1–3, 6–7^{mm} long, the lateral or ventral surfaces nearly plane: hypostyle 3–4^{mm} long.

Cratægus macra is abundant in the flat woods of northwestern Georgia, especially at Rome (type locality).

The original specimens, which are deposited in the Biltmore Herbarium, represent both flowers (*B2250*) and fruit (*B2250*^{2}) from the same tree.

Cratægus regalis n. sp.

A tree sometimes 10^{m} tall with a trunk 2–3^{dm} in diameter, covered with ashy-gray or brownish scaly bark, the ascending and spreading branches often armed with chestnut-brown or gray spines: leaves oval, broadly oval or elliptic, the blades 3–8^{cm} long, 1.5–5^{cm} wide, acute or acuminate at the apex, contracted or broadly cuneate at the base, the borders serrate and on leading shoots often incised; they are glabrous, or when young bear a few weak hairs along the midrib and on the upper surface, bright green and lustrous above, pale beneath, firm to subcoriaceous in texture, fading in autumn with tones of yellow, orange and brown: petioles 5–15^{mm} long, margined: flowers 12–14^{mm} wide, opening

the last of April and when the leaves are almost fully grown; they are produced in glabrous, compound, many-flowered corymbs, the lowest branches of which arise from the axils of leaves: pedicels and hypanthium glabrous: sepals 4–5^{mm} long, linear-lanceolate, entire or remotely serrate, spreading or reflexed after anthesis: stamens about 10, the anthers yellow: fruit, which ripens in September and October, oblong, about 8^{mm} thick and 1^{cm} long: nutlets mostly 2–3, 7–8^{mm} long, the lateral or ventral surfaces nearly plane: hypostyle 5–6^{mm} long.

Cratægus regalis often forms a handsome, symmetrical tree, which, on account of its broad, lustrous foliage, is destined to be a favorite in cultivation. Grows in low woods in northwestern Georgia and northern Alabama, and is common in the flat woods near Rome, Georgia (type locality).

The original specimens (*B1212* and *B2251*) are preserved in the Biltmore Herbarium.

Cratægus algens n. sp.

A large shrub or small tree 2–5^{m} tall, sometimes with a short trunk 1–2^{dm} in diameter, clothed with dark gray or brownish-black scaly bark, the ascending and spreading branches frequently armed with stout chestnut-brown or gray spines: leaves obovate- or oblong-cuneiform, sometimes broadly obovate or elliptic, the blades 2–6^{cm} long, 1.5–4^{cm} wide, either rounded or pointed at the apex, wedge-shaped or more abruptly contracted at the base, the borders serrate, at least above the middle; they are glabrous at maturity, bright green and lustrous on the upper surface, pale beneath, and when young bear a few pale hairs along the midrib on the upper surface, eventually firm or subcoriaceous in texture, fading in autumn with tones of yellow, orange and brown: petioles 5–15^{mm} long, margined: flowers 12–14^{mm} wide, opening at the type station about the middle of May and when the leaves are two-thirds or more grown; they are borne in compound, glabrous, many-flowered corymbs, the lowest branches of which are axillary: pedicels and hypanthium glabrous: sepals 4–5.5^{mm} long, entire or remotely serrate, spreading or reflexed after anthesis: stamens about 10, the anthers yellow: fruit, which ripens in September and October, subglobose or somewhat ovoid, 8–10^{mm} thick, dull red, or green and red at maturity: nutlets mostly 1–2, 7–8^{mm} long, the ventral surface nearly plane: hypostyle 5^{mm} long.

Cratægus algens grows in woods and fields from North Carolina to northern Georgia, Alabama and eastern Tennessee, and near Biltmore, N. C. (type locality), is one of the commonest species of the group.

The type material is preserved in the Biltmore Herbarium.

Cratægus pyracanthoides n. sp.

A shrub or small tree 2–5^{m} tall, the trunk or main stems clothed with ashy-gray or brownish either smooth or scaly bark, the branches often armed with chestnut-brown or gray spines 1.5–4^{cm} long: leaves obovate, oblanceolate or elliptic, the blades 1.5–5^{cm} long, 7^{mm}–3^{cm} wide, glabrous, acute or rounded at the apex, cuneate at the base, the margins serrate above the middle; they are glabrous, or when young bear a few weak hairs along the midrib on the upper surface, bright green and lustrous above, pale green beneath, eventually firm or subcoriaceous in texture, fading with tones of yellow, orange and brown: petioles 2–10^{mm} long, margined: flowers, which open early in April and when the leaves are almost fully grown, produced in compound, glabrous, many-flowered corymbs: pedicels and hypanthium glabrous: sepals 2.5–4^{cm} long, entire or remotely serrate, spreading or reflexed after anthesis: stamens 7–12, the anthers purplish: fruit, which ripens in September, globose or nearly so, 5–8^{mm} in diameter, bright red at maturity: nutlets mostly 2, 5–6^{mm} long, the ventral surface nearly plane: hypostyle about half the length of the nutlet.

Cratægus pyracanthoides grows on the banks of the Chipola river, near Marianna, Florida (type locality).

The type specimens (*B2090*, *B2090*^{2} and *B1075*) are preserved in the Biltmore Herbarium.

Cratægus armata n. sp.

A shrub or small tree 2–5^{m} tall, the short trunk or main stems covered with ashy-gray or brownish, scaly bark: branches ascending and spreading, freely armed with stout chestnut-brown or gray spines 3–6^{cm} long: leaves oblong- or obovate-cuneiform, the blades 2–4^{cm} long, 1–2^{cm} wide, or on leading shoots oval, 2.5–3.5^{cm} wide, rounded, mucronate or even acute at the apex, wedge-shaped or more abruptly contracted at the base, the margins serrate above the middle or occasionally subentire; they are glabrous, bright green and lustrous on the upper surface at maturity, pale beneath,

subcoriaceous in texture, fading with tones of yellow, brown and orange: petioles 5–10^{mm} long, margined: flowers produced in compound, glabrous, many-flowered corymbs, the lowest branches of which arise from the axils of leaves: pedicels and hypanthium glabrous: sepals 2.5–4^{mm} long, entire or slightly serrate, spreading or reflexed after anthesis: stamens 7–10: fruit, which ripens in September and October, globose or nearly so, 5–8^{mm} wide, dull red, pruinose: nutlets 1–2, 6–7^{mm} long, the ventral surface nearly plane: hypostyle 3–4^{mm} long.

Cratægus armata grows on the limestone hills and ridges of middle Tennessee and northern Alabama, and near Nashville, Tennessee (type locality), is relatively common.

The type specimens (*H771* and *H1269*) are preserved in the Biltmore Herbarium.

Cratægus arborea n. sp.

A tree sometimes 8–10^{m} tall with a trunk 2–3^{dm} in diameter, covered with dark gray, fissured, exfoliating bark, the spreading or ascending branches, which are usually unarmed, forming a wide crown: leaves obovate-cuneiform or oblanceolate, the blades 2–6^{cm} long, 12^{mm}–4^{cm} wide, rounded or pointed at the apex, wedge-shaped at the base, the margins serrate except at the base or below the middle; they are glabrous, bright green and lustrous on the upper surface, pale and glabrous beneath, firm to subcoriaceous in texture, fading with tones of yellow, orange and brown: petioles 5–15^{mm} long, winged or margined: flowers 12–15^{mm} wide, opening about the middle of April and when the leaves are almost fully grown; they are produced in glabrous, compound, many-flowered corymbs, the lower branches of which are axillary: pedicels and hypanthium glabrous: sepals 2.5–4^{mm} long, mostly entire, spreading or reflexed after anthesis: stamens about 20, the anthers light yellow: fruit, which ripens in September and October, globose or subglobose, 6–9^{mm} thick, red or ruddy at maturity: nutlets mostly 2, about 7^{mm} long, the ventral surface nearly plane: hypostyle 4–5^{mm} long.

Cratægus arborea grows in pine woods, mostly in clay soil, at Montgomery, Alabama (type locality).

The original specimens (*B2170* and *B2170*^{2}) are preserved in the Biltmore Herbarium.— C. D. Beadle.

STUDIES IN THE GENUS AMORPHA

Having recently both occasion and opportunity to give considerable study to the species of the genus Amorpha occurring in the southeastern portion of the United States, the writer has become convinced that there are a number of well marked forms now unrecognized in the classification adopted by current botanies. Besides the species usually admitted to the genus and those described below, there is little doubt that a careful and more extended study of certain forms, both in the field and subjected to cultivation, will reveal others with valid and constant characters. In pursuing my studies I have had spread before me in addition to the specimens in the Biltmore Herbarium, the material of the Gray Herbarium of Harvard University, the Missouri Botanical Gardens, United States National Herbarium and the Philadelphia Academy of Sciences. The writer wishes to acknowledge with grateful thanks the assistance accorded him by the gentlemen in charge of the respective collections.

Amorpha montana n. sp.

A glabrous, much-branched shrub 1–2^{m} high. Leaves 7–15^{cm} long; leaflets 9–19, ovate, oblong-ovate or oval, 2–5^{cm} long, thin, glabrous on both surfaces, obtuse, often emarginate, rounded or subcordate at the base: racemes usually clustered, 6–15^{cm} long, glabrous: calyx campanulate, about 3^{mm} long, the sepals very shallow and sparsely ciliate: standard orbicular, short clawed, about 7^{mm} long: legume 7–8^{mm} long, rounded on the ventral edge, nearly straight on the dorsal, light brown, marked with a few small glands.

Amorpha montana differs from *A. virgata* Small,[66] with which it has been confounded, by its much-branched habit, by having thin, perfectly glabrous leaflets and by the very short sepals, which in fruit are often but a wavy border. It is common in the mountains and foothills of North and South Carolina, Tennessee, Alabama and Georgia. The type material was collected at Biltmore, N. C., and is represented by specimens distributed by the Biltmore Herbarium as No. 14, Biltmore, N. C., May 13 and August 29, 1896.

[66] Bull. Torr. Bot. Club **21**: 17, 1894.

Amorpha nitens n. sp.

A branching, nearly glabrous shrub 1.5–3^{m} high with glossy, chestnut-brown twigs and shining leaves. Leaves 12–25^{cm} long; leaflets 7–19, thin, oblong-ovate or ovate, 2–6^{cm} long, obtuse, rounded at the base, lower surface dull and sparsely pubescent or glabrate, the upper surface appearing when fresh as if varnished: racemes slender, usually solitary, 12–25^{cm} long: calyx obconic, about 3^{mm} long: sepals short and rounded, or the three lower short-pointed, ciliate on the margins: legume about 7^{mm} long, narrow, much curved and nearly glandless.

The very glossy leaves and twigs in the growing plants are striking characters. The much-curved legumes suggest *A. fruticosa* L.,[67] but in the last named species they are conspicuously marked with raised glands, while in *A. nitens* they are glandless, or nearly so.

The habit and leaf characters are more like *A. virgata* Small, l. c., which, on the contrary, has dull or glaucous twigs.

The type material was collected in a swamp near Waynesboro, Georgia, July 24, 1900, and is preserved in the Biltmore Herbarium.

AMORPHA ANGUSTIFOLIA (Pursh)

A. fruticosa angustifolia Pursh.

A much-branched shrub 1.5–3^{m} high, the young growth finely strigose-pubescent with grayish hairs. Leaves 7–20^{cm} long; leaflets, 9–27, elliptic to linear-oblong, 2–4^{cm} long, mostly acute at both ends, the midrib projecting in a prominent awn-like cusp, both surfaces minutely puberulent: racemes single or a few in a cluster, 5–20^{cm} long: calyx about 3.5^{mm} long, the two upper sepals rounded, the lower sharp-pointed, the middle one the longest: standard broadly obovate, short clawed, 4.5–5^{mm} long: legume 6-7^{mm} long, strongly curved, distinctly marked with raised glands. Banks of streams, Texas and northward.

AMORPHA TEXANA MOLLIS nom. nov.

A. lævigata pubescens A. Gray, Pl. Wright. **1**: 49, 1852. Not *A. pubescens* Willd. or Schlecht.

The above form apparently differs only from *A. texana* Buckley[68] in having all the parts clothed with fine, soft tomentum. It can-

[67] Sp. Pl. 713, 1753.

[68] Proc. Acad. Phila. **1861**: 452, 1861.

not properly be referred to *A. lævigata* Nutt.[69] which, according to Nuttall and my own observations, has the leaflets attenuate at the base, a glabrous calyx and very long racemes. Both *A. texana* and its variety have leaflets with rounded bases, a pubescent calyx and short racemes. *A. paniculata* T. & G.[70] is so very different from *A. texana mollis*, as exemplified by the very rugose or veiny leaflets and different inflorescence, that there seems to be no good reason for confounding them, as was done by Watson.[71]

AMORPHA TENNESSENSIS Shuttlw. Ind. Sem. Lips. **1848,** 1 (Linnæa **24**: 191, 1851).

This species, contrasted with *A. fruticosa* L. l. c., its nearest relative, may be recognized by the relatively smaller legumes and the smaller and much more numerous leaflets, especially those which are borne on the twigs and shoots produced after the flowering season. Grows on the banks of streams in middle Tennessee, and is distributed eastward to North Carolina and southward to Georgia and Alabama.—F. E. BOYNTON.

BILTMORE HERBARIUM,
Biltmore, N. C.

[69] Torr. & Gray Fl. N. A. **1**: 306, 1838.
[70] Fl. N. A. **1**: 306, 1838.
[71] Bibliog. Index **1**: 188, 1878.

TWO NEW SOUTHERN SPECIES OF COREOPSIS

Coreopsis falcata n. sp.

A glabrous perennial herb 8–12^{dm} high. Stem stout, erect, hollow, corymbosely-branched near the summit, round, striate, leafy to the branches: radical and lower leaves scythe-shaped, 2–3^{dm} long including the petioles, 1–2^{cm} broad, terminating in a rather blunt point, entire or with one or more narrow, ascending lobes, gradually narrowed below into a winged petiole which is enlarged at the base and forms a clasping sheath; upper stem leaves narrower, sessile by a clasping base, usually with 2–4 very narrow lateral lobes, the terminal portion of the blade long and curved; leaves of the branches much reduced in size or bract-like: heads several, 3–5^{cm} broad including the rays: outer involucral bracts lanceolate, 5–7^{mm} long, the inner about one-third longer than the outer, oblong-elliptic to broadly ovate, thin, marked with purple lines: chaff of the receptacle linear, acute, tipped with red: rays orange-yellow, three-lobed, the middle lobe the largest, rounded or sometimes notched at the apex: ovary minutely hispid on the margins: pappus a pair of straight awns: ripe achenes not seen.

The species above proposed is evidently related to *C. longifolia* Small [72] and *C. gladiata* Walt.[73] The longer outer involucral bracts of *C. falcata*, together with its more robust habit and peculiar leaves, present characters which serve to distinguish it from both species mentioned.

The original specimens were collected in shallow water near Pembroke, N. C., June, 1901. The type material is preserved in the Biltmore Herbarium.

Coreopsis stenophylla n. sp.

A glabrous, annual or short-lived perennial herb 3–4^{dm} high. Stem stiff and wiry, usually several from the same base, striate, leafy throughout: leaves firm, erect or ascending, opposite, narrowly linear to filiform, 2–6^{cm} long, the lower sometimes 2^{mm} wide and narrowed into slender petioles; the upper 1^{mm} or less wide, often with one or two filiform, lateral segments: heads several,

[72] Bull. Torr. Bot. Club **22**: 47, 1895.
[73] Flora Carol. 215, 1788.

2-3cm broad including the rays: exterior involucral bracts 1–2mm long, the inner 5–6mm long, ovate, thin, dark red with a narrow border of a lighter color: chaff of the receptacle linear, acute, dark red as also are the disk florets: rays bright yellow, obovate, with three rounded lobes at the summit: achenes oblong to elliptic-oblong, 1.5–2mm long, bordered by a narrow, entire wing which is about one-third as wide as the body: pappus consisting of two blunt, short teeth.

Coreopsis stenophylla is related to *C. cardaminefolia* (DC.) T. & G.[74] The wiry stems and crowded, erect leaves which are mostly longer than the internodes, give *C. stenophylla* a very different aspect, and these characters serve to distinguish it from any form of the above mentioned species. The type material was collected in pine woods near Hammond, Louisiana, September 17, 1900, and is preserved in the Biltmore Herbarium.—F. E. Boynton.

Biltmore Herbarium,
Biltmore, N. C.

[74] Fl. N. Am. 2:346, 1842.

NOTES FROM A COLLECTOR'S FIELD-BOOK

A few notes from a collector's field-book may prove of interest to other collectors and will, perhaps, throw some light on the distribution and habitats of some of the species mentioned.

LEITNERIA FLORIDANA Chapm. Flora S. U. S. ed. 1, 428, 1860.

While exploring a swamp along the Altamaha river, some twenty miles above its mouth, in July, 1901, I found a new station for this rare shrub. It was growing in black alluvial soil on the margin of the swamp and bordering a cultivated field — quite a different habitat from that of the original specimens which Dr. Chapman gathered in "salt or brackish marshes." At this station the plants are quite abundant, growing to a height of two or three meters, their luxuriance evidently indicating a thriving condition.

QUERCUS GEORGIANA M. A. Curtis. Am. Journ. Sci. ser. 2, **7**: 406, 1849.

Three stations, other than those already published, have been noted by the writer, all in Georgia: at Winder, Jackson county, on a granite outcrop, where were also found *Gymnolomia porteri* A. Gray,[75] *Solidago yadkinensis* (Porter) Small,[76] *Kneiffia linifolia* (Nutt.) Spach,[77] and other plants which are associated with it at the original or Stone Mountain station; at Rockmart, Polk county, on a rough hill of broken slate, and at Warm Springs, Meriwether county, where it becomes a tree 1.5–2^{dm} in diameter and 12–16^{m} high. These stations extend the range of the species at least seventy-five miles westward and about one hundred miles to the south.

ULMUS SEROTINA Sargent. Bot. Gaz. **27**: 92, 1899.

I note one station in Alabama for this rare elm which Dr. Mohr in his "Plant Life of Alabama" does not mention and which has

[75] Proc. Am. Acad. **12**: 59, 1877.
[76] Bull. Torr. Bot. Club **22**: 368, 1895.
[77] Nouv. Ann. Mus. Par. **4**: 368, 1835.

probably not been published. On a limestone ridge north of Birmingham, in Jefferson county, it is quite plentiful. Flowering specimens were collected there September 18, 1899. Thin limestone soil seems to offer the most favorable natural conditions for this tree, and the soil is of this character at all of the several stations where I have seen it growing.

HICORIA CAROLINÆ-SEPTENTRIONALIS Ashe. Notes on Hickories, 1896.

I find this species rather common throughout the Piedmont region of South Carolina and Georgia and have collected it as far west as Birmingham, Alabama. I have found it growing in the flatwoods, which are mostly low, clay lands, rather wet or at times inundated, where it probably attains its greatest size, and also, in contrast with the above, growing in thin soil on rocky or gravelly hills, mostly of limestone formation. The largest specimen I have recorded is 7.5^{dm} in diameter, a tree growing in the low woods near Clinton, South Carolina.

FRAXINUS CAROLINIANA Mill. Dict. ed. 8, No. 6, 1768.

I found this tree during the season of 1901 at two stations in North Carolina, growing, it seems to me, under rather unusual conditions. At Rockingham it is quite common along the margin of a millpond in red clay soil, and at Wadesboro it is growing among the boulders of the rocky bed of a small stream. My former collections have always been from river swamps or black alluvial soil near streams.

ACER LEUCODERME Small. Bull. Torr. Bot. Club, **22**: 367, 1895.

This maple seems quite widely distributed. I have collected it at many points, always in thin, rocky soil near streams. A few stations that occur to me are Rome, Athens and Augusta in Georgia; Dadeville, Collinsville and Birmingham in Alabama, and at Chattahoochee, Florida.

ILEX GLABRA (L.) A. Gray. Manual, ed. 2, 264, 1856.

What seems an unusual station for this shrub is one near Carrollton, Georgia, where I found the species in a small swamp

on October 3, 1901. This point is in the red clay country and at least two hundred and fifty miles from the coast.

FOTHERGILLA MAJOR Lodd. Bot. Cab. **16**: t.1520, 1830.

Collected along the rocky banks of the stream above Toccoa Falls at Toccoa, Georgia, thus adding one more station to the few already known for this shrub.

PRUNUS CUTHBERTI Small. Bull. Torr. Bot. Club, **28**: 290, 1901.

Collected at Warm Springs, Meriwether county, Georgia, also a single specimen noted at Hawkinsville, Georgia, the past season.

BERBERIS CANADENSIS Mill. Dict. ed. 8, No. 2, 1768.

While at Augusta, Georgia, I was shown a locality where, in rather thin, rocky soil in shady woods, quite a quantity of this shrub was growing. This station marks, possibly, the southern limit of its range. Elliott[78] notes a point on the Santee river near Eutaw Springs, in about the same latitude as Augusta. So far as I know the Augusta station has never been published, although it has been known for some time to the Messrs. Berckmans, on whose land it occurs, as well as to Mr. A. Cuthbert of Augusta.

RHUS MICHAUXI Sargent, Gard. and Forest, **8**: 404, 1895.

Found in abundance at a station in Moore county, North Carolina, in light sandy soil. Pieces of the characteristic stolons could be pulled up, several meters in length, with the short upright stems (2–3^{dm} long) attached. Hardly in bloom June 12, 1901. A few plants were also seen on the edge of a cultivated field near Roswell, Cobb county, Georgia, during the season of 1900.

KALMIA CUNEATA Michx. Flora, **1**: 257, 1803.

A new station for this rare kalmia was found in Moore county, North Carolina. It was not common, although a few plants were found at several points some miles apart, growing along the margins of swamps. In bloom June 12, 1901.

[78] Bot. S. C. and Ga. **1**: 412, 1821.

PRUNUS INJUCUNDA Small. Bull. Torr. Bot. Club, **25**: 149, 1898.

Collected quite frequently. A few points I note are as follows: Meriwether, Cobb, Gwinnett, Jackson and Bibb counties, Georgia, and at Trenton, South Carolina. At Warm Springs, Georgia, a sport with double flowers was frequently observed growing with the normal form.

ZENOBIA PULVERULENTA (Willd.) Pollard. Bull. Torr. Bot. Club, **22**: 232, 1895.

I found a small patch of this beautiful shrub in full bloom June 2, 1901, in the pine barrens near Florence, South Carolina. I also made collections in Robeson and Moore counties, North Carolina, where it is rather more common, at least at some points, than is *Z. cassinefolia* (Vent.) Pollard,[79] with which it was for years confused or at most considered only varietally distinct. The delicately shaded bluish-gray foliage and large campanulate flowers present characters which should place this species among garden shrubs, wherever it will prove hardy.

TRACHELOSPERMUM DIFFORME (Walt.) A. Gray. Syn. Flora **2**: part 1, 85, 1878.

An abundance of this peculiar woody vine was found in a swamp along the Black river near Kingstree, South Carolina, in full flower May 31, 1901.

PHILADELPHUS HIRSUTUS Nutt. Gen Am. **1**: 301, 1818.

My first collections of this species in Georgia were made in 1899 on the cliffs of the Coosa river at Rome, and also in June of the same year on the rocky slopes of Kennesaw Mountain. It is also frequent in moist soil along the brow of the precipitous rocks on the west side of Lookout Mountain, near Chattanooga, Tennessee.

HYPERICUM DOLABRIFORME Vent. Hort. Cels. pl. 45, 1800.

My first collection of this species was made in Chickamauga Park, Dade county, Georgia, in July, 1899. It was common over quite an area of thin limestone soil.

[79] Bull. Torr. Bot. Club **22**: 231, 1895.

ISOETES BUTLERI Engelm. Coult. Bot. Gaz. **3**: 1, 1878.

On the same date and at the same locality mentioned in the last note, I found an abundance of this species growing in a shallow depression, which, although almost dry at the time of my visit, is doubtless at times filled with water. The plants were growing in sticky mud.

BAPTISIA SERENÆ M. A. Curtis. Am. Journ. Sci. (I) **7**: 406, 1845.

This rare Baptisia was collected this season at Augusta, Georgia, and also at Aiken, South Carolina. Both stations were in dry, sandy, pine woods.

ASPLENIUM BRADLEYI D. C. Eaton. Bull. Torr. Club, **4**: 11, 1873.

Collected on the Etowah river near Cartersville, Georgia, from the crevices of an overhanging cliff, where it was associated with *A. pinnatifidum* Nutt.[80] These two species are often found growing side by side, and I have several times collected them under such conditions.

RUDBECKIA TRUNCATA Small. Bull. Torr. Bot. Club, **25**: 478, 1898.

Collected at Cedartown, Georgia, in full flower October 4, 1901. Abundant in low grounds near a small stream.

POLYGALA RUGELI Shuttlw. Chapm., Coult. Bot. Gaz. **3**: 4, 1878 and Flora S. U. S. suppl. 613, 1882.

Collected in September, 1901, in low grounds near Tavares, Florida. It grows in similar situations as does its more common relative, *P. lutea* L.,[81] which it somewhat resembles, but from which it may readily be distinguished by its larger size and *light yellow* instead of orange-colored flowers.

POLYGALA BALDWINI Nutt. Gen. **2**: 90, 1818.

Taken at the same station as noted under the last heading.

[80] Gen. **2**: 251, 1818.
[81] Sp. Pl. 705, 1753.

TRILLIUM LANCEOLATUM Boykin, S. Watson Proc. Am. Acad. **14**: 274, 1879.

The only station I have ever found for this rare Trillium is on the western slope of Lookout mountain, in Hamilton county, Tennessee. It was growing in rocky soil, in shade.

EUPHORBIA MERCURIALINA Michx. Flora **2**: 212, 1803.

This species, which seems to be but poorly known, I found among broken rocks on the slopes of Lookout Mountain, near Chattanooga, Tennessee. I have also taken it on the cliffs of the Coosa river, near Rome, Georgia.

NYMPHÆA SAGITTÆFOLIA Walt. Fl. Car. 155, 1788.

Collected near Fayetteville, North Carolina, the past season, where I found it growing in small ponds together with its more common relative, *N. advena* Soland.[82]

Gerardia georgiana n. sp.

While collecting in the pine barrens near Cordele, Dooly county, Georgia, in September, 1901, I found a gerardia which was so strikingly different from any I had seen before that I at once decided it must be new. Later comparisons with herbarium specimens bear out this assumption, and I, therefore, adopt the above name and append the following description:

Annual, 3–5^{dm} high: stem obscurely four-angled, minutely roughened, much-branched: branches long and ascending, the lower frequently equaling the main axis in length: leaves linear, 1–1.5^{cm} long, acute at the apex, tapering from below the middle to a slender base, about 1^{mm} wide, scabrous above, smooth beneath, the margins revolute: flowers mostly alternate: pedicels stout, erect, about as long as the calyx: calyx campanulate, 2–3^{mm} long: sepals triangular-subulate, 1-1.5^{mm} long: corolla small, rarely over 1^{cm} long, the tube funnel-form or but slightly swollen, somewhat villous in the throat; corolla-lobes nearly equal, spreading, rounded, ciliate on the margins: stamens nearly equal, the filaments of the longer pair together with the anthers, which are mu-

[82] Ait. Hort. Kew. **2**: 226, 1789.

cronate at the base of the sacs, villous: capsule spherical, 3–4^{mm} in diameter.

Gerardia georgiana grows in moist, sandy soil in pine barrens. From the axils of most of the leaves is borne a small branchlet which bears from five to ten small leaves, having much the appearance of being disposed in fascicles, thereby giving the stem a densely leafy appearance up to the inflorescence. The densely leafy stems and very small flowers present characters so different from other gerardias that it seems almost unnecessary to contrast this species with others. Perhaps it is nearer *G. purpurea fasciculata* (Ell.) Chapm.,[83] but its smaller size, smaller flowers and nearly straight corolla tubes, which are less villous within, together with its stamen characters, easily separate it from this form. The type specimens are deposited in the Biltmore Herbarium.

SMILAX PUMILA Walt. Fl. Car. 244, 1788.

I collected this species in flower at Columbus, Georgia, September 28, 1901, and also note it from St. John's Island near Charleston, South Carolina.

LYSIMACHIA ASPERULÆFOLIA Poir. Encl. Suppl. **3**: 477, 1823.

A station for this rare lysimachia was located in Cumberland county, North Carolina, during the past season, where it is quite common in low, wet grounds near small streams. In flower June 5, 1901.

LYSIMACHIA LOOMISI Torr. Croom's Cat. Pl. Newbern, 46, 1837.

L. angustifolia Michx., Fl. **1**: 128, 1803. Not Lam.

L. stricta angustifolia Chapm. Fl. S. U. S. ed. 1, 280, 1860; Gray, Syn. Flora, ed. 2, **2**: 63, 1886.

This species, for years ignored and for a time considered a variety under *L. stricta* Ait.,[84] seems to find no place in recent botanical literature. It was found by the writer at a point in Cumberland county, North Carolina, during the past season, where it is quite plentiful in certain localities. There were no evidences of variations or forms that would indicate a connection with *L. terrestris* (L.) B.S.P.,[85] which species does not, to my knowledge, occur in the same locality. Subsequent study and comparison of this material with herbarium specimens of *L. ter-*

[83] Flora S. U. S. ed. 1, 300, 1860.
[84] Hort. Kew. **1**: 199, 1789.
[85] Prel. Cat. N. Y. 34, 1888.

restris from various sections of the United States, leads me to consider *L. loomisi* a valid species, and, in view of its rather obscure publication, I make bold to recharacterize it.

Perennial, 3–6 dm high: stem usually branched near the summit, striate, minutely roughened with blackish glands, or nearly smooth below: leaves sessile, mostly opposite but occasionally alternate, linear, obtuse at the apex, tapering to a slender base, 2–5cm long, 1–3mm wide, the uppermost, or bracts of the inflorescence, abruptly reduced in size, 3–5mm long and about 1mm wide; they are firm in texture, veinless, the midrib and revolute margins prominent beneath, and on both surfaces appear black or brownish-black spots, the lower bearing in addition many small brown glands: axils frequently bearing short branches or fascicles of small leaves: racemes narrow, few-flowered, leafy-bracted, terminating the main stem and upper branches, the terminal 6–10cm long, those of the branches 2–5cm in length: pedicels 3–6mm long, scarcely exceeding the bracts and of about the same length throughout the racemes: sepals oblong or oblong-lanceolate, acute, 2–3mm long, bearing on the edges and sometimes on the outer surface, minute stalked glands: corolla about 1cm broad, the lobes oval or ovate, acute, yellow with a few brown lines or spots: stamens unequal, the filaments dilated below, united near the base and thickly covered, as is the lower portion of the corolla, with minute, yellow, stalked glands: sinuses of the filaments broad, bearing low, triangular teeth or appendages: capsule spherical.

Grows in low grounds near streams and was found in flower June 8, 1901. This species finds its nearest relative in *L. terrestris* l. c., but presents many points of difference. The most obvious characters are found in the somewhat glandular stem, the narrow, linear, obtuse leaves with brown glands on the under surface, the scarcely tapering, less floriferous racemes with their shorter pedicels and longer bracts, the smaller corollas with broader, more acute segments and the tooth-like lobes in the sinuses of the filaments.—C. L. Boynton.

Biltmore Herbarium,
Biltmore, N. C.

A SKETCH OF THE SAND MOUNTAIN FLORA

During the past three years I have made a number of visits to the Sand Mountain region of Alabama, and believing that some of my observations may be of interest I venture to give a few notes from my field-book. The Sand Mountain region, taken in its broadest sense, comprises an area of more than four thousand square miles, lying principally within the counties of Jackson, DeKalb, Marshall, Blount, Cullman and Winston in Alabama, and Dade county in Georgia. This region is drained by the Black Warrior, Coosa and Tennessee rivers.

The Sand Mountain proper, as understood by the inhabitants of that region, includes only that portion lying north and east of the depression which separates the main range from its western extension in Blount and Cullman counties and comprises an area of about one thousand six hundred square miles, lying principally within Marshall, Jackson and DeKalb counties in Alabama, and Dade county in Georgia. This table-land is drained by tributaries of the Tennessee river. The altitude of the Sand Mountain plateau varies from three hundred meters in the southern portions to five hundred and fifty meters in the northern portion at the crest of the bluff overlooking the Tennessee river, near Bryant, Jackson county, Alabama. The surface rocks of the entire plateau are carboniferous sandstones and conglomerates, and the soil resulting from the decompositions of these rocks varies from a coarse rocky, sterile soil on the ridges, to a sandy loam in the swales and small bottoms.

In the spring of 1901 I entered this region at Cullman, Cullman county, Alabama. I had visited this locality in 1900 and found much of interest to me, but the immediate region was so thoroughly explored by the late Dr. Charles Mohr that I can report but little of interest not already mentioned by him.

Along a small stream in a rocky wood, associated with *Viola tripartita* Ell.[86] and *Anemone quinquefolia* L.,[87] I found *Waldsteinia*

[86] Bot. S. C. & Ga. I: 302, 1817.
[87] Sp. Pl. 541, 1753.

lobata (Baldw.) Torr. & Gray.[88] This plant, so far as I know, has not been reported from Alabama. Here I found *Stuartia malachodendron* L.[89] and *Stuartia pentagyna* L'Her.[90] growing together. A careful search revealed the fact that *Trillium stamineum* Harbison[91] is the most common trillium in Cullman county. This species seems to be quite rare and local. I also found it near Tuscaloosa, Alabama, the only station outside of Cullman county known to me for this sessile-flowered trillium.

From Cullman I drove to Albertville, Alabama, a distance of about forty miles. Albertville is situated about midway between Attalla and Guntersville on a branch of the N. C. & St. L. Ry. and may be reached from either of these stations in an hour's time by rail. This is a convenient point for collectors wishing to visit the central portion of the plateau. The average altitude of this part of the table-land is about three hundred and forty meters above sea-level. About five miles from Albertville, along a rocky slope bordering a stream and at an elevation of three hundred meters, associated with *Robinia boyntoni* Ashe[92] and *Viburnum molle* Michx.[93], I found *Rhododendron catawbiense* Michx.[94] growing luxuriantly and in full bloom on May 10. This is, according to my observations, the southern limit of this most beautiful species of rhododendron.

In glades and along streams numerous species of *Cratægus* are found. *Ilex longipes* Chapm.[95] is one of the most common shrubs of the region. *Ilex beadlei* Ashe[96] and *Ilex mollis* A. Gray[97] are frequently found growing side by side, but very distinct in habit and general appearance. Growing in similar situations, though less common, is found a small smooth holly, apparently a depauperate form of *Ilex monticola* A. Gray.[98] In moist, shady situations along streams, I found *Fothergilla carolina* (L.) Britton.[99] *Acer leucoderme* Small[100] is a common tree along the rocky slopes near streams. *Ribes curvatum* Small[101] is abundant, growing in great masses on bluffs along streams and in the rocky glades.

88 Fl. N. Am. **1**: 426, 1840.
89 Sp. Pl. 698, 1753.
90 Stirp. 155, t. 74, 1784.
91 B. B. Studies **1**: 23, 1901.
92 Journ. E. Mitchell Soc. **14**2: 51, 1898.
93 Flora, **1**: 180, 1803.
94 Flora, **1**: 258, 1803.
95 Trelease, Trans. St. Louis Acad. **5**: 346, 1889.
96 Bot. Gaz. **24**: 377, 1897.
97 Man. ed. 5, 306, 1867.
98 Man. ed. 2, 264 1856.
99 Mem. Torr. Club, **5**: 180, 1894.
100 Bull. Torr. Club, **22**: 367, 1894.
101 Bull. Torr. Club, **23**: 295, 1896.

Ribes cynosbati L.[102] is sparingly found in shady situations along streams and in the gorges. In shallow soil in the glades and along rocky streams I found *Chondrophora virgata* (Nutt.) Greene.[103] In the glades and sandy pine woods I found *Coreopsis auriculata* L.,[104] *C. grandiflora* Hogg,[105] *C. lanceolata* L.,[106] *C. oemleri* Ell.[107] and *C. pubescens* Ell.[108] In a glade near Albertville I collected *Solidago rigida* L.[109] This species is not common in Alabama. Growing out of crevices of rocks along Short creek, three miles from Albertville, I found *Hypericum dolabriforme* Vent.[110] This is as far south as I have ever observed this species. *Silene caroliniana* Walt.[111] is not rare in dry sandy or rocky woods about Albertville.

From Albertville I drove to Pisgah, Jackson county, a dis tance of about fifty miles. Pisgah is a small village on the Sand Mountain four miles from the western escarpment on the road leading from Sublet Ferry on the Tennessee river to Valley Head, Alabama, on the A. G. S. Ry. The easiest way to reach Pisgah is by private conveyance from Hollywood, a station on the Southern Railway in Jackson county, Alabama.

The altitude of Pisgah is three hundred and eighty meters and the highest point on the bluff, above Sublet Ferry and overlooking the Tennessee river valley, is about eighty-five meters higher than the village, being four hundred and sixty-five meters above sea-level and two hundred and seventy-five meters above the river. From Pisgah numerous small swamps, rocky glades, several deep gorges and the steep western escarpment of the mountain may be visited in a day's tramp. This is, I believe, the best point from which to study the Sand Mountain flora.

The main channels of drainage of the Sand Mountain table-land have cut deep gorges through the western escarpment, and one of the deepest and most interesting of these gorges, known as the Pisgah "gulf," begins near Pisgah. The Pisgah gulf is a deep, wild gorge with precipitous walls of sandstone from fifty to one hundred and twenty-five meters high. If the stream is

102 Sp. Pl. 202, 1753.
103 Erythea 7: 91, 1895.
104 Sp. Pl. 908, 1753.
105 Sweet Brit. Fl. Gard. 2: t. 175, 1825–27.
106 Sp. Pl. 908, 1753.
107 Bot. S. C. and Ga. 2: 435, 1821–24.
108 Bot. S. C. and Ga. 2: 441, 1821–24.
109 Sp. Pl. 880, 1753.
110 Hort. Cels. t. 45, 1800.
111 Fl. Car. 142, 1788.

not swollen by heavy rains it is possible to enter this gorge at its head and to follow along the bed of the stream through the gorge into the Tennessee river valley. Before reaching the level of the valley the stream has cut its way through the sandstone to the underlying subcarboniferous limestone. In the spring of 1899, with Mr. John Scott of Pisgah as a guide, I went through the gorge, and since then have several times visited this interesting spot at different seasons of the year.

In this gorge plants of the Alleghanian and Carolinian plant-life areas intermingle. Here *Betula lenta* L.[112] and *Tsuga canadensis* (L.) Carr.[113] make trees of considerable size. *Rhododendron catawbiense* Michx.[114] and *Hydrangea quercifolia* Bartr.[115] grow side by side. *Hydrangea arborescens* L.,[116] *H. radiata* Walt.[117] and *H. cinerea* Small[118] are also found in or along the gorge. *Ribes cynosbati* L.[119] is common among the rocks throughout the gorge above the limestone formation, *Diervilla rivularis* Gattinger[120] is common about the cascades, and on the rocks in dry situations *Philadelphus hirsutus* Nutt.[121] and *Hypericum aureum* Bart.[122] are found. The latter usually found growing in calcareous soil, finds here a congenial habitat on the sandstone, growing luxuriantly and blooming profusely. Along the stream *Azalea arborescens* Pursh,[123] *Ilex verticillata* (L.) A. Gray,[124] *Viburnum cassinoides* L.[125] and *Stuartia pentagyna* L'Her.[126] are common shrubs.

In crevices of rocks along the precipitous walls of the gorge, I found *Deschampsia flexuosa* (L.) Trin.[127] On wet rocks I found *Arisæma triphyllum* (L.) Torr.,[128] *Syndesmon thalictroides* (L.) Hoffmg.,[129] *Vagnera racemosa* (L.) Morong.,[130] *Chelone lyoni* Pursh,[131] *Chelone glabra* L.,[132] *Therofon aconitifolia* (Nutt.) Millsp.,[133] and *Carex costellata* Britton.[134] In several moist shady situations *Rudbeckia heliopsidis* T. & G.[135] was collected. This rudbeckia

112 Sp. Pl. 983, 1753.
113 Trait. Conif. 185, 1855.
114 Flora **1**: 258, 1803.
115 Travels, 382, t. 7, 1791.
116 Sp. Pl. 397, 1753.
117 Fl. Car. 251, 1788.
118 Bull. Torr. Club, **25**: 148, 1898.
119 Sp. Pl. 202, 1753.
120 Bot. Gaz. **13**: 191, 1888.
121 Gen. **1**: 301, 1818.
122 Travels, 383, 1791.
123 Flora Am. Sept. **1**: 152, 1816.
124 Man. ed. 2, 264, 1856.
125 Sp. Pl. ed. 2, **1**: 384, 1762.
126 Stirp. 155, t, 74, 1784.
127 Bull. Acad. St. Petersburg **1**: 66, 1836.
128 Flora N. Y. **2**: 239, 1843.
129 Flora **15**: part 2, Intell. Bl. 4, 34, 1832.
130 Mem. Torr. Club, **5**: 114, 1894.
131 Flora Am. Sept. **2**: 737, 1814.
132 Sp. Pl. 611, 1753.
133 Bull. W. Va. Agr. Exp. Sta. **2**: 361, 1892.
134 Bull. Torr. Club, **22**: 223, 1895.
135 Fl. N. A. **2**: 310, 1842.

seems to be rare and local in Alabama. *Helianthus longifolius* Pursh[136] was collected in dry sunny situations along rocky slopes and on the bluff above the gorge. In the summer of 1899 I collected this rare helianthus near Albertville, Alabama. *Parnassia asarifolia* Vent.,[137] not common in Alabama, grows in several spots along small streams near Pisgah. *Viola hastata* Michx.,[138] rare in Alabama, is found in shady situations, though never plentifully. *Trillium stylosum* Nutt.[139] is abundant in the region, and is the only species of trillium observed on the table-land about Pisgah. In the sand along Bryant's creek, I observed *Polygonella americana* (Fish. & Meyer) Small[140] and with it *Eriocaulon decangulare* L.[141] In all the small swamps and moist swales in the woods *Sarracenia catesbæi* Ell.[142] is found, and a plant common to the swamps is *Helianthus polyphyllus* Small.[143]

Cratægus uniflora Muench.[144] is a common undershrub in the rocky woods and *Cratægus rubella* Beadle[145] is also quite common.

The benches and slopes along the western escarpment of the mountain offer a promising field for the collector. Here in many places the primeval forest remains undisturbed. Here *Castanea dentata* (Marsh.) Borkh.[146] reaches its best development in the state of Alabama. On the table-land the chestnut is almost extinct, owing in a great measure to the custom of burning the woods to improve the pasturage. On this part of the mountain *Polymnia lævigata* Beadle[147] is frequent. I have traced this species for a distance of seventy-five miles along the mountain, and found it always on the sandstone above the limestone formation. At the base of the mountain, on the limestone formation, I found *Neviusa alabamensis* A. Gray.[148] This station is more than one hundred miles from Tuscaloosa, Alabama, the only other station known for this rare shrub. Associated with neviusa are *Staphylea trifolia* L.,[149] *Tilia heterophylla* Vent.,[150] *Aristolochia tomentosa* Sims,[151] *Calycocarpum lyoni* (Pursh) Nutt.,[152] *Menispermum canadense*

136 Fl. **2**: 571, 1814.
137 Jard. Malm. 39, 1803.
138 Flora **2**: 149, 1803.
139 Gen. **1**: 239, 1818.
140 Mem. Torr. Club, **5**: 141, 1894.
141 Sp. Pl. 87, 1753.
142 Bot. S. C. & Ga. **2**: 11, 1821–24.
143 Bull. Torr. Club, **25**: 480, 1898.
144 Hausv. **5**: 147, 1770.
145 Bot. Gaz. **30**: 344, 1900.
146 Forst. Bot. **1**: 741, 1800.
147 Bot. Gaz. **25**: 278, 1898.
148 Mem. Am. Acad. n. ser. **6**: 374, 1859.
149 Sp. Pl. 270, 1753.
150 Mem. Acad. Par. **4**: 16, t. 5, 1802.
151 Bot. Mag. t. 1369, 1811.
152 A. Gray, Gen. Ill. **1**: 76, 1848.

L.,[153] *Cubelium concolor* (Forst.) Raf.,[154] and *Urtica chamædryoides* Pursh.[155]

From Pisgah I drove up along the mountain to Bryant, a country post office at Moore's Gap, three miles from Carpenter, a station on the Southern Railway. The distance from Pisgah to Bryant is about thirty-five miles as the indirect road runs. The road passes around the "breaks" at the head of several "gulfs" and numerous small swamps are passed, in all of which *Sarracenia catesbæi* Ell.[156] may be found. In the deep shade in several ravines leading into Coon creek gulf, *Azalea lutea* L.[157] was observed. Hitherto, so far as I can learn, this species of azalea has not been credited to Alabama. At Bryant I found an unusually good and homelike boarding house kept by Mr. McGee. Mr. McGee's house stands near a precipice overlooking the Tennessee and Sequatchie valleys, and a minute's walk will enable the collector to reach the slopes and benches below the bluff. A walk of forty minutes will take him to the Devil's punch-bowl, a deep chasm at the head of a wild gorge. In this gorge I found a flora quite similar to that in the Pisgah gorge, but I observed no plants of *Hydrangea quercifolia* Bart.[158] *Rhododendron catawbiense* Michx.[159] is abundant and *Ribes cynosbati* L.[160] covers the rocks in places. *Hypericum dolabriforme* Vent.[161] was found along the streams in crevices of rocks above the cataract. On exposed rocks along the bluffs *Talinum teretifolium* Pursh[162] is not rare.

In shallow soil in the glades *Scutellaria parvula* Michx.[163] is occasionally seen. In open places in the woods and in old fields *Senecio smalli* Britton[164] is a common weed. *Tænidia integerrima* (L.) Drude,[165] not common in Alabama, was found along the bluffs at McGee's. Under shelving rocks along the bluffs *Heuchera parviflora* Bartl.[166] is occasionally found, and in crevices of rocks *Cheilanthes lanosa* (Michx.) Walt.[167] was observed. In moist shady situations on the ledges of rocks, *Silene rotundifolia* Nutt.[168]

153 Sp. Pl. 340, 1753.
154 Jackson, Index Kew., **1**: 663, 1893.
155 Flora Am. Sept. **1**: 113, 1814.
156 Bot. S. C. & Ga. **2**: 11, 1821–24.
157 Sp. Pl. 150, 1753.
158 Travels, 382, t. 7, 1791.
159 Flora, **1**: 258, 1803.
160 Sp. Pl. 202, 1753.
161 Hort. Cels. t. 45, 1800.
162 Flora Am. Sept. **2**: 365, 1814.
163 Flora, **2**: 11, 1803.
164 Mem. Torr. Club, **4**: 132, 1893.
165 Engl. & Prantl, Nat. Pfl. **3**: abt. 8, 195, 1898.
166 Ind. Sem. Hort. Gotting. (1838) Linnæa, **13**: 96, 1839.
167 Trimen's Journ. Bot. **12**: 48, 1847.
168 Gen. **1**: 288, 1818.

was found in several places. Here and there in shady situations I observed *Botrychium virginianum* (L.) Sw.[169] At several points along the mountain in deep shade I collected *Viola canadensis* L.[170] This is the only station in Alabama where I found this violet. *Scutellaria montana* Chapm.[171] is a common plant on shaded slopes. On the uppermost of the cherty strata of the subcarboniferous limestone formation, I found *Aristolochia convolvulacea* Small[172] abundantly represented. This species blooms from one to two weeks in advance of *Aristolochia serpentaria* L.[173] I collected *A. convolvulacea* in Coffee county, Tennessee, in 1899, and since then have observed it on Walden's Ridge, and in the Cumberland mountains of Tennessee, always in more or less siliceous soil. On the mountain I observed *Aristolochia nashi* Kearney,[174] but *A. serpentaria* is the more common form.

To the already large list of plants indigenous to Alabama we may now add *Hypericum dolabriforme* Vent.,[175] *Waldsteinia lobata* T. & G.,[176] *Viola canadensis* L.,[177] *Polymnia lævigata* Beadle,[178] *Robinia boyntoni* Ashe,[179] *Helianthus polyphyllus* Small,[180] *Solidago rigida* L.,[181] *Azalea lutea* L.,[182] *Carex costellata* Britton[183] and *Aristolochia convolvulacea* Small.[184]—T. G. Harbison.

Biltmore Herbarium,
Biltmore, N. C.

169 Schrad. Journ. Bot. 1800: pt. 2, 111, 1801.
170 Sp. Pl. 936, 1753.
171 Bot. Gaz. **3**: 11, 1878.
172 Bull. Torr. Club, **24**: 335, 1897.
173 Sp. Pl. 96, 1753.
174 Bull. Torr. Club, **21**: 485, 1894.
175 Hort. Cels., t. 45, 1800.
176 Flora N. A. **1**: 426, 1840.
177 Sp. Pl. 936, 1753.
178 Bot. Gaz. **25**: 278, 1898.
179 Journ. E. Mitchell Soc. **14**[2]: 51, 1898.
180 Bull. Torr. Club, **25**: 480, 1898.
181 Sp. Pl. 880, 1753.
182 Sp. Pl. 150. 1753.
183 Bull. Torr. Club, **22**: 223, 1895.
184 Bull. Torr. Club, **24**: 335, 1897.

Trillium decumbens n. sp.

Stem decumbent, mostly solitary but sometimes clustered, 5–12^{cm} tall, densely pubescent above the middle: leaves broadly ovate or suborbicular, 4.5–9^{cm} long, obtuse or sometimes acutish at the apex, mottled and somewhat pubescent at the base on the veins beneath, sessile: flowers sessile: sepals about half as long as the petals, lanceolate to broadly lanceolate, acute, green tinged with purple: petals 3.5–7^{cm} long, 5–12^{mm} broad, acuminate or sometimes acute, erect, twisted, brownish-purple: stamens about one-fourth as long as the fully grown petals: filaments very short, from one-half to three-fourths as long as the prolongation of the very broad connective: stigmas short, stout and recurved: berry ovoid, about 1^{cm} in diameter, prominently and sharply angled.

In rocky woods of the Sand Mountain region in northeastern Alabama. Blooms on the ridge near Collinsville, DeKalb county (type locality), the latter part of April.

Trillium decumbens was first discovered by Mr. C. L. Boynton of the Biltmore Herbarium, in the spring of 1901. The decumbent habit and erect, twisted petals immediately attracted Mr. Boynton's attention, and I copy from his notes concerning this species as follows: "Stem very short and invariably declined. Leaves resting upon the ground, thus presenting a most unique appearance. The petals are more than twice as long as the acute sepals."

A number of plants which blossomed in the greenhouse and which were collected at the original station, were observed and measured by the writer. Plants with stems only half a decimeter long were invariably decumbent. This habit, together with the large, erect, twisted petals and very prominent prolongation of the connective, afford characters which readily separate this species from all other pubescent species in this group.—T. G. Harbison.

Biltmore Herbarium,
Biltmore, N. C.

PHILADELPHUS INODORUS **strigosus** n. var.

A shrub 1–2^{m} tall with branching stems clothed with brown, exfoliating bark: leaves ovate or oval, 2–4^{cm} long exclusive of the short petioles, 8^{mm}–2^{cm} wide, or on vigorous shoots larger, eventually glabrate or with short, appressed hairs on the upper surface, thickly and permanently covered beneath by appressed, rather stiff pubescence, prominently 3-nerved, the borders entire or with minute distant teeth; they are acute at the apex, rounded or slightly narrowed at the base, firm in texture, deep green above, pale green on the lower surface, falling in autumn before or soon after the first frost: flowers solitary or in twos and threes: pedicels and hypanthium glabrous: sepals acute, frequently coated on the exterior surface with pale hairs: stigmas free: capsules 9–12^{mm} long, 6–9^{mm} wide, long persistent.

Philadelphus inodorus strigosus differs from *P. inodorus* L.[185] by the thick covering of appressed, rather stiff hairs on the lower surface of the leaves and frequently on the exterior of the sepals. The specimens upon which the description is based were collected in central South Carolina, in Lexington and Richland counties. I designate as type a specimen of A. C. Hexamer and F. W. Maier, ex herb. George Thurber, now preserved in the Gray Herbarium of Harvard University.

Philadelphus gloriosus n. sp.

A deciduous shrub 2–3^{m} tall with branching stems, the bark of the previous season's growth dark brown, exfoliating: leaves ovate or elliptic, the blades 4–10^{cm} long, 1.5–5^{cm} broad, acute at the apex, either rounded or narrowed at the base, the margins remotely dentate; they are prominently 3-nerved, or occasionally 5-nerved, at maturity glabrate or with short appressed hairs, thin in texture, bright green above, pale beneath, changing in autumn to tones of yellow and brown: petioles 3–6^{mm} long: flowers mostly 3–5, 3–4^{cm} broad, opening about the first of May: pedicels and hypanthium glabrous: sepals acute: stigmas free:

[185] Sp. Pl. 470, 1753.

capsules abruptly contracted at the base, about 1^{cm} long, 8–9^{mm} wide, persistent long after the falling of the leaves.

Philadelphus gloriosus grows on the rocky banks of the Coosa river near Rome, Georgia (type locality). Undoubtedly related to *P. grandiflorus* Willd.,[186] but obviously differing from this species in the very abrupt point of attachment between the pedicel and capsule.

The type material is preserved in the Biltmore Herbarium.

Philadelphus floridus n. sp.

A deciduous shrub 2–3^{m} tall with branching stems, the bark of the last season's shoots dark brown, exfoliating: leaves oval or elliptic, the blades 4–10^{cm} long, 2–5^{cm} broad, acute at the apex, either rounded or narrowed at the base, the borders remotely toothed; they are glabrate above, sparsely pubescent on the lower surface, prominently 3-nerved, or occasionally 5-nerved, thin in texture, bright green above, pale beneath, falling in early autumn: petioles 3–7^{mm} long: flowers occasionally solitary but mostly 3–5, 3–4^{mm} wide, expanding early in May: pedicels and hypanthium appressed pubescent: sepals acuminate, the exterior surface appressed pubescent: stigmas not united.

Philadelphus floridus was originally collected on the rocky slopes and banks of the Coosa river near Rome, Georgia. Differs from all of the species of the South Atlantic region with few or solitary flowers by the pubescence of the pedicels and hypanthium.

The type material is preserved in the Biltmore Herbarium.

Philadelphus intectus n. sp.

A deciduous shrub 2–3^{m} tall with branching stems, the bark of the shoots gray or ochre-color, not exfoliating: leaves ovate, oval or elliptic, the blades 3–12^{cm} long, 1–5^{cm} wide, acute or acuminate at the apex, either rounded or narrowed at the base, the borders entire or remotely dentate; they are glabrous or glabrate on both surfaces, prominently 3-nerved, or sometimes 5-nerved, thin in texture, bright green above, pale green beneath, falling in early autumn: petioles 3–7^{mm} long: flowers racemose, mostly numerous, the lower pair axillary, 3–4^{cm} wide, expanding

[186] Enum. Hort. Berol. 511, 1809.

about the middle of May: pedicels, hypanthium and exterior surface of the sepals glabrous: stigmas free.

Philadelphus intectus was collected on the bluffs of the Cumberland river below Nashville, Tennessee (type locality). From *P. latifolius* Schrad.[187] this species may be recognized by the glabrous or glabrate leaves and by the absence of pubescence on the hypanthium and exterior surface of the sepals.

The type specimens are deposited in the Biltmore Herbarium.—C. D. Beadle.

Biltmore Herbarium,
Biltmore, N. C.

[187] D. C. Prod. **3**: 206, 1828.

TWO DRUPACEOUS TREES FROM ALABAMA

Prunus (Padus) australis n. sp.

A tree 10–20^{m} tall with a trunk sometimes 3–4^{dm} in diameter, clothed with ashy-gray or brownish-black bark, the surface of which, on the trunk, is fissured and reticulately broken into thin persistent scales: branches spreading or ascending, forming an oblong crown: leaves obovate, oval or elliptic, the blades 4–10^{cm} long, 2–6^{cm} wide, abruptly and rather bluntly pointed at the apex, or occasionally obtuse, either rounded or obtusely narrowed at the base, the borders finely serrate; they are dark green and smooth on the upper surface at maturity, densely and permanently clothed on the lower surface with tawny or rufous tomentum, not at all glaucous, and at the time of unfolding are light green, glabrous above except a few pale hairs along the midrib, densely coated on the lower surface with pale or tawny pubescence, biglandular at the base or on the petioles: petioles 1^{cm} or less long, densely covered with tawny or rufous tomentum: stipules linear, 3–10^{mm} long or more, pectinate, bright rose-purple, early deciduous: raceme-rachis and pedicels as well as the young shoots, pubescent: flowers, which open towards the end of April, borne on short pedicels which arise from the axils of minute, rose-purple, caducous bracts, and disposed in spreading, narrow, many-flowered racemes 6–15^{cm} long: drupes globose, 5–8^{mm} in diameter, dark purple when fully ripe, falling in July.

Prunus (*Padus*) *australis* is common in clay soil at Evergreen, Alabama (type locality). Readily distinguished from the species heretofore recognized and occurring in the Southern States, and which are characterized by the pubescence of the leaves, young shoots, racemes and pedicels, by the dense and permanent tawny or rufous tomentum covering the entire lower surface of the leaf-blades.

The type material, which is preserved in the Biltmore Herbarium, consists of vernal, late summer and autumnal specimens.

Prunus mitis n. sp.

A small tree or large shrub 4–8^{m} tall, seldom spiny, the trunk or large stems clothed with dark gray or reddish-brown bark, the

branches spreading or ascending, forming a wide crown: twigs glabrous, shining: leaves elliptic, oblong-lanceolate, rarely ovate or obovate, the blades 2–9^{cm} long, 1–4^{cm} wide, acute or acuminate at the apex, narrowed or rounded at the base, sharply serrate, biglandular at the base or on the upper portion of the petioles; they are finely pubescent on both surfaces and especially along the prominent midrib and veins beneath, thin in texture, bright green above, pale beneath, fading in early autumn with tones of yellow: petioles 4–10^{mm} long, densely pubescent: flowers, which appear before the leaves and expand towards the end of March, produced in 2–6-flowered umbels, and are borne on slender, glabrous pedicels, 8^{mm}–2^{cm} long: hypanthium glabrous, at least the lower portion: sepals triangular, subacute, pubescent on the exterior and very densely so on the inner surface: drupe oblong, 10–14^{mm} long, at maturity dark purple with a glaucous bloom: stone ovoid or oval, slightly compressed, about 1^{cm} long, pointed at both ends and especially at the apex, crested on one margin.

Prunus mitis is common in dry soil in Lee county, Alabama, and is represented in many herbaria by specimens distributed under labels of the Alabama Biological Survey.

The type specimens, which are preserved in the Biltmore Herbarium, were collected at Auburn, Lee county, Alabama, March 27 and May 20, 1900, by F. S. and Esther S Earle, No. 27.—C. D. Beadle.

Biltmore Herbarium,
Biltmore, N C.